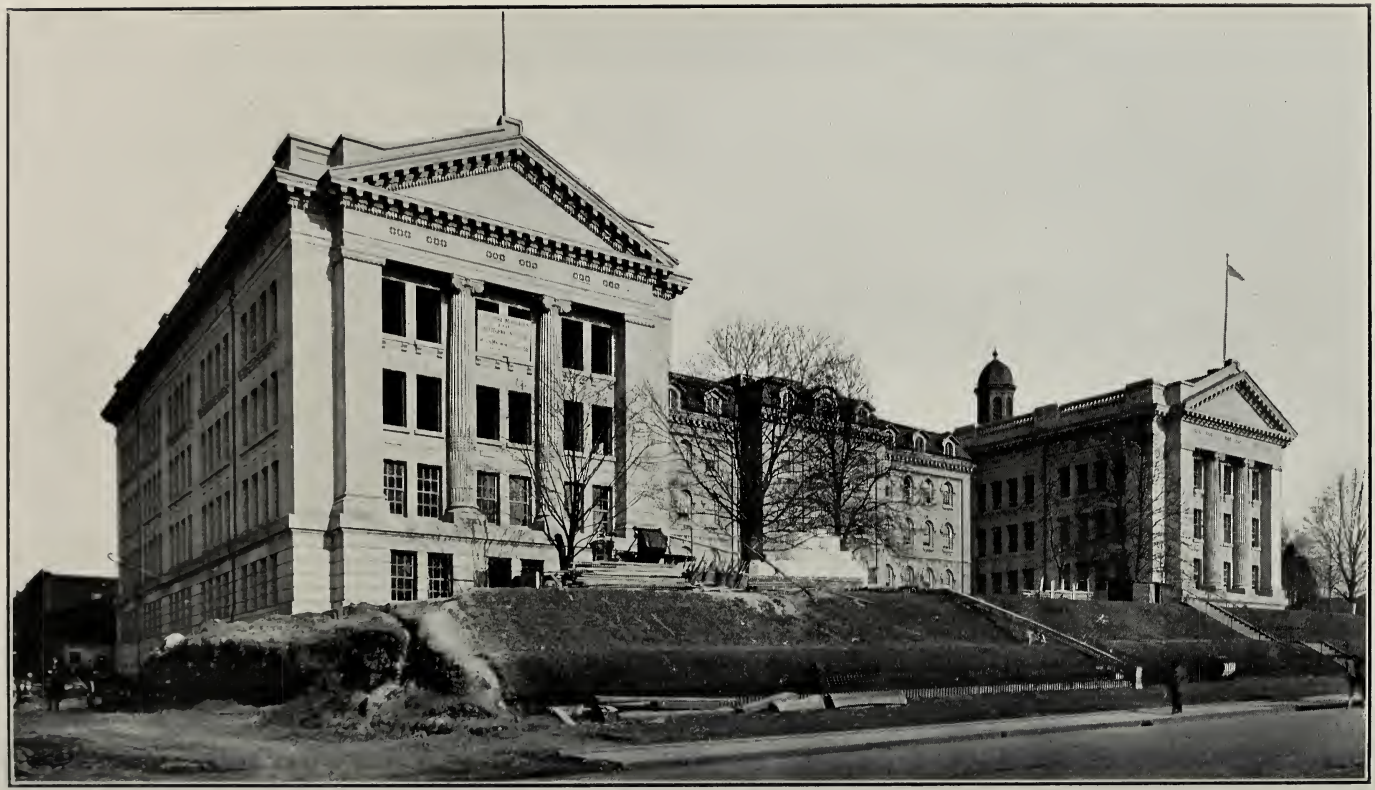
REGISTER

OF THE

BALTIMORE POLYTECHNIC INSTITUTE

1913 - 1914



BALTIMORE POLYTECHNIC INSTITUTE—NORTH AVENUE

ANNUAL REGISTER

of the

Baltimore Polytechnic Institute

200-240 E. NORTH AVENUE

TWENTY - NINTH
ACADEMIC YEAR

1913 - 1914

CONTENTS.

	PAGE
Historical Sketch	7
Floor Plans of New Institute	10-14
Board of School Commissioners	15
Board of Visitors	15
Superintendent of Public Instruction	15
Record of Faculty and Staff	16
Faculty	21
Faculty and Staff by Departments	22
Calendar of School Year, 1913-1914	24
Course of Study and General Statement of Plan and Purpose	25
The Course of Instruction in Detail	34
Table of Time Devoted to Subjects	42
Requirements for Admission	43
Merit Rolls	44
Final Merit Roll of Mid-Year Graduating Class of 1913	45
Final Merit Roll of Graduating Class of 1913	48
Address to the Graduating Classes of 1913	57
Some Recent Examination Papers	63
Specimen Entrance Examination Papers	84
Catalogue of Students	86
Summary of Enrollment	103
Class Organizations	104
Board of Student Activities	106
Literary Societies	107
The June Play	109
The Minstrels	111
Baseball	113
Football	114
The Marksmen's Club	115
Track	116
Lacrosse	117
Tennis	118
Polo	119
Eligibility Rules	120
Catalogue of Graduates	121
Class Memorials	136

BALTIMORE POLYTECHNIC INSTITUTE.

HISTORICAL SKETCH.

The Baltimore Polytechnic Institute, a secondary technical school maintained by the City of Baltimore, was the second educational institution in the United States to establish manual training as a part of the course of a public school system.

Although it is believed that tentative efforts to ingraft manual training upon the City's school system were made as early as 1873, yet the action which led to the establishment of this school was not taken until April, 1883. At a meeting of the Board of Commissioners of Public Schools, held on the 24th of that month, Mr. Joshua Plaskitt, Commissioner for the Ninth Ward, offered a resolution for the appointment of a committee "to consider—the advisability of establishing a school or schools for manual training." The resolution was adopted, and the committee thus appointed recommended the establishment of a school "for manual education." The necessary enabling ordinances and enactments having been passed by the City Council of Baltimore and by the General Assembly of Maryland, the school was organized and opened on the Courtland Street site, on February 26, 1884, under the name of "Baltimore Manual Training School" with Dr. Richard Grady as Director.

In January, 1886, the faculty was reorganized, Lieutenant John D. Ford of the Engineer Corps of the U. S. Navy, who had been detailed for duty at the school, becoming Principal.

From the opening of the school applicants for admission had been required to pass through the eighth grade of the grammar schools, or to show satisfactory evidence of having had equivalent instruction; but in September, 1888, it was

decided to admit pupils of the sixth, seventh and eighth grammar grades. This action opened the school to so large a number that increased accommodations became imperative, and in June, 1890, a new building, devoted to the academic studies and drawing, was erected and occupied.

Lieutenant Ford was recalled to the naval service in June, 1890, and was succeeded as Principal by John W. Saville, a retired member of the Engineer Corps of the Navy.

In May, 1893, the name of the school was changed to "Baltimore Polytechnic Institute," and the titles of Principal and Vice-Principal to President and Vice-President, respectively.

Mr. Saville resigned in August, 1899, and was succeeded as President by Lieut. William R. King, Engineer Corps, U. S. N., the present head of the school.

Early in 1900 a comprehensive and exhaustive report discussing the conditions, needs and aims of the school, and recommending certain changes in the requirements for admission and in the curriculum, was submitted to the Board of School Commissioners by the Board of Visitors, a body created by a provision in the new charter of the City of Baltimore which went into effect on March 1st, 1900. The partial adoption of this report in September, 1900, excluded grammar school pupils from the Institute, thus making the requirements for admission the completion of the course prescribed for the elementary schools.

In May, 1902, the course was made, by action of the Board of School Commissioners, four years in length for all entries on and after September 15, 1902.

By operation of the new charter the titles of President and Vice-President were changed to Principal and Vice-Principal.

The enrollment becoming greater than the buildings on Courtland street could accommodate, No. 46 Grammar School on Division street was fitted as an annex in 1908, and in Sep-

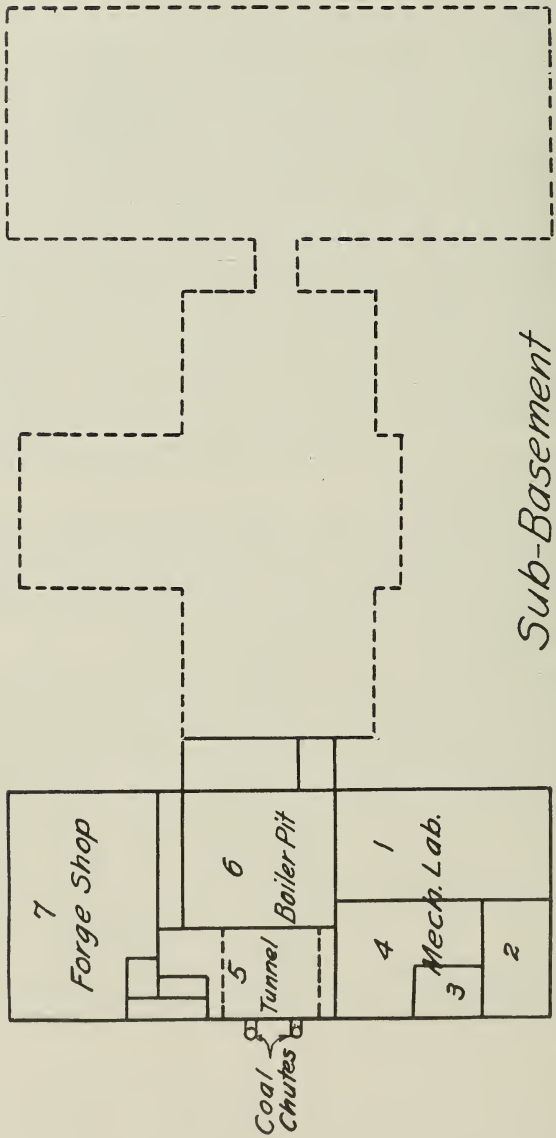
tember of that year the first-year class was there accommodated.

In order to provide for the continued growth of the Institute, the City Council, by an ordinance approved April 19, 1909, directed the Mayor, the City Comptroller, and the President of the Board of School Commissioners to acquire by purchase the property on North avenue then occupied by the Maryland School for the Blind. That property, containing nearly six acres, was subsequently purchased for $345,000, and plans were instituted for the erection of a building to provide for an ultimate accommodation of 2,000 students, but the subsequent opening of Calvert street through the grounds compelled the modification of the plans to their present dimensions, which provide for the possible accommodation of 1,500 students.

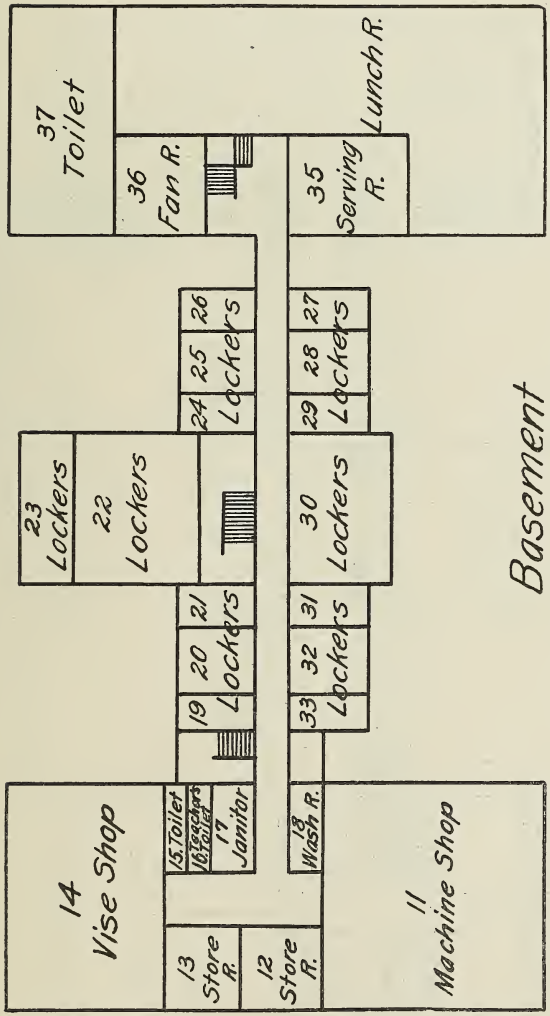
The main building on the North avenue property having been altered in accordance with the architect's plans for the new Institute, the first-year class was moved there from the Division street annex on December 5, 1910.

On March 17, 1911, ground was broken on the North avenue site, and on September 22, 1913, the new building was occupied for the session of 1913-1914. The frontispiece is a general view of the building and grounds and shows the stage of completion of the structure on January 1, 1913. On pages 10, 11, 12, 13 and 14 are shown the floor plans from which a conspectus of the work of the school may be obtained.

The growth of the school has been remarkable, which is shown from the fact that in 1902 there were but 153 students of high school grade on the rolls, whereas the enrollment on February 2, 1914, was 1228.



FLOOR PLANS OF NEW POLYTECHNIC INSTITUTE.



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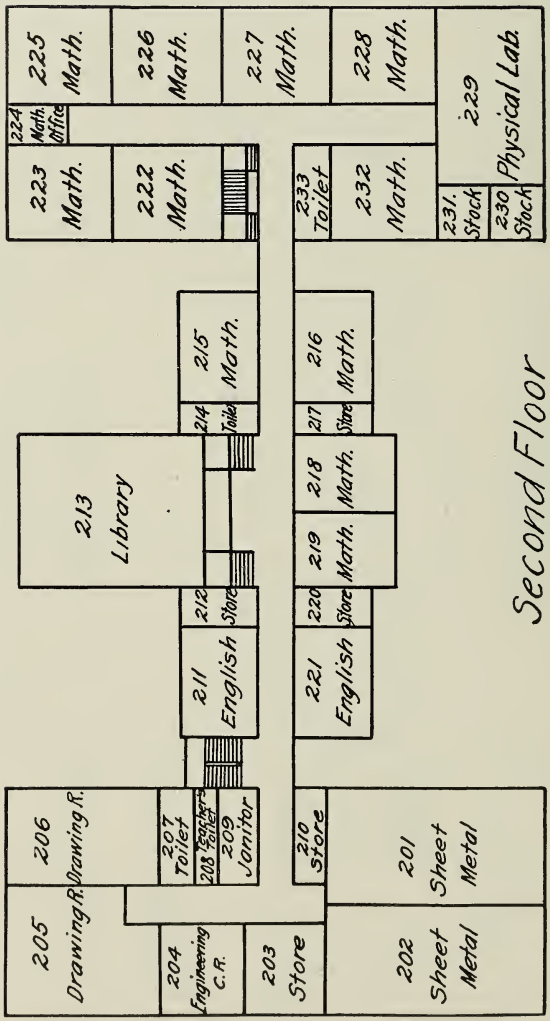

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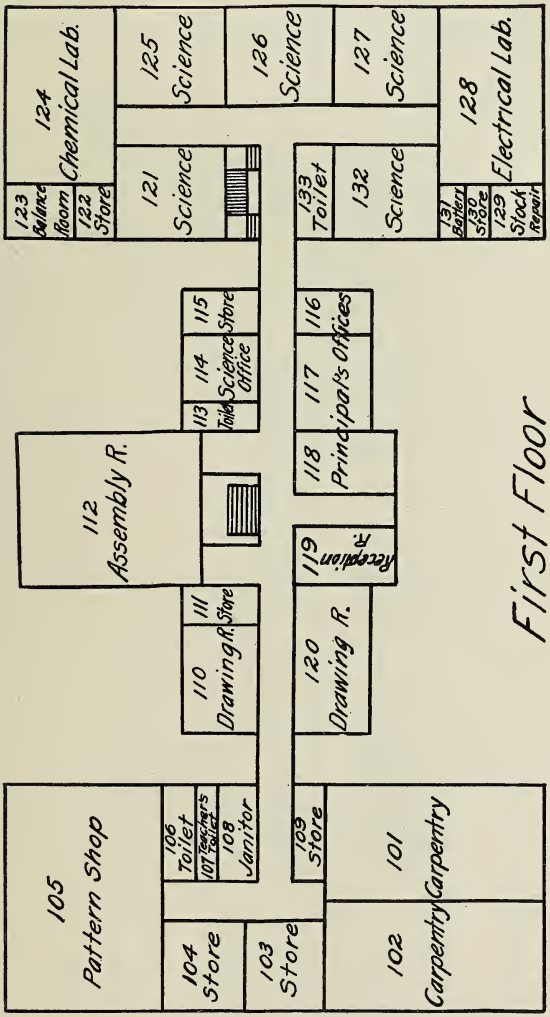

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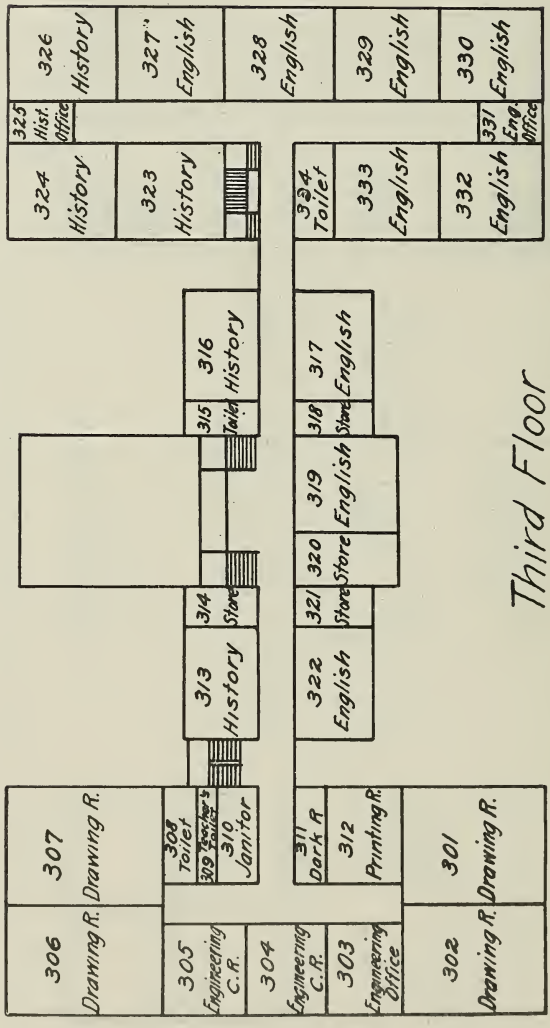


FLOOR PLANS OF NEW POLYTECHNIC INSTITUTE.

BOARD OF SCHOOL COMMISSIONERS.

THOMAS McCOSKER, *President*,
JAMES M. DELEVETT,
ALBERT T. CHAMBERS,
HENRY JOESTING, JR.,
SIDNEY P. THANHOUSER,
RICHARD J. BIGGS,
ALBERT L. FANKHANEL,
COL. CLARENCE DEEMS,
ARTHUR B. BIBBINS.

BOARD OF VISITORS.

ABRAM H. COLMARY, *Chairman*,
FREDERICK W. WOOD,
FREDERICK J. MAYER,
JAMES L. MURRILL,
WILLIAM H. ROTHROCK,
MENDES COHEN,
FREDERICK H. WAGNER.

SUPERINTENDENT OF PUBLIC INSTRUCTION.

FRANCIS A. SOPER.

RECORD OF THE FACULTY AND STAFF.

ARRANGED IN ORDER OF APPOINTMENT.

William R. King, Passed Assistant Engineer, U. S. N. (retired), U. S. N. A., 1875. Principal and Head of Department of Engineering, September 1, 1899; relinquished duties of Head of Department of Engineering, September, 1911.

William H. Hall, B. C. C. (diploma), 1885; A. M., Washington College (Md.), 1906; Instructor in Department of Science, September 23, 1886; Head of Department of Science, September 13, 1899; Vice-Principal, January 1, 1912.

William G. Richardson; Instructor in Department of Engineering, February, 1887.

J. Ward Willson, B. C. C. (diploma), 1861; M.D., Baltimore University, 1889; Instructor in Department of English and Modern Languages, March 21, 1889.

George M. Gaither, B. M. T. S. (diploma), 1888; Instructor in Department of Engineering, April 1, 1889; Supervisor of City manual training centers in addition to Institute duties, September, 1902.

Samuel M. North, B. C. C. (diploma), 1887; B.S., A.M., Columbia University, 1912, 1913; Instructor in Department of Mathematics, September, 1884; Head of Department of English and Modern Languages, September 13, 1899.

Samuel P. Platt; Instructor in Department of Engineering, October 1, 1897.

Oliver Bacharach, B. C. C. (diploma), 1897; Instructor in Department of Mathematics, April, 1898.

J. Edward Broadbelt, B. M. T. S. (diploma), 1890; Ph.G., Maryland College of Pharmacy, 1893; Instructor in Department of Science, September, 1898.

Charles Ernest Conway, B. P. I. (diploma), 1902; Graduate Assistant in Department of Engineering, June 11, 1902; at Lehigh University, 1903-1904; Graduate Assistant in Department of Engineering, 1904-1905; Instructor in Department of Engineering, September, 1907; Head of Department of Engineering, February 1, 1912.

Irving L. Twilley, A.B., A.M., Western Maryland College, 1889, 1892; Instructor in Department of English, September, 1903; transferred to Department of Science, June, 1904.

Henry A. Converse, A.B., Hampton-Sidney College, 1893; Ph.D., Johns Hopkins University, 1903; Instructor in Department of Mathematics, May, 1904; resigned, September 1, 1906, to accept the chair of Mathematics at Davis and Elkins College; Instructor in Department of Science, June, 1908; Acting Head of Department of Mathematics, February, 1909; Head of Department of Mathematics, September, 1909.

Edward Reisler, A.M., Western Maryland College, 1888; Instructor in Department of English, May, 1904.

Elmer M. Harn, A.B., A.M., Rock Hill College (Md.), 1892, 1895; Instructor in Department of English, July, 1904.

Isaac L. Otis, A.B., New York University, 1899; Instructor in Department of English, September, 1904; Instructor in Department of History and Civics, September, 1906.

Allen L. Malone, B. P. I. (diploma), 1902; at Cornell University, 1902-1903 and 1903-1904; Instructor in Department of Engineering, October 1, 1904.

Allen B. Souther, B.S., Harvard, 1897; Instructor in Department of Engineering, October, 1905.

Harvey S. Houskeeper, A.B., Lehigh University, 1872; Instructor in Department of Mathematics, September, 1896.

Henry Bogue, Jr., A.B., Johns Hopkins University, 1889; Instructor in Department of Engineering, September, 1906.

Thomas F. Garey, A.B., A.M., Washington College (Md.), 1904, 1907; LL.B., University of Maryland, 1907; Instructor in Department of Mathematics, November, 1906.

William H. Wilhelm, A.B., B.S., A.M., St. John's College (Md.), 1893, 1896; Instructor in Department of Mathematics, June 12, 1907.

James B. Arthur, B. P. I. (diploma), 1904; intermittent work at Lehigh University, 1905, 1907; Instructor in Department of Science, September 25, 1907; on leave of absence, 1913-1914.

William P. Stedman, A.B., Trinity College (Conn.), 1905; Instructor in Department of English and Modern Languages, February 12, 1908.

Charles Frederick Ranft, A.B., Johns Hopkins University, 1902; Instructor in Department of History and Civics, June, 1908.

Philip Dougherty, B.S., Trinity College (Conn.), 1907; A.M., Columbia University, 1909; Instructor in Department of History and Civics, June, 1908; Acting Head of Department of History and Civics, 1912-1913; Head of Department of History and Civics, September, 1913.

George N. Anderson, Pratt Institute (N. Y.), (diploma), 1908; Instructor in Department of Engineering, September, 1908.

Clarence P. Bolgiano, B. P. I. (diploma), 1908; Science Laboratory Assistant, September, 1909; Substitute in Department of Engineering, February, 1912; Instructor in Department of Engineering, January 1, 1914. Intermittent work at Lehigh, Cornell and Johns Hopkins Universities.

Laurance F. Magness, B. P. I. (diploma), 1907; Instructor in Department of Engineering, September, 1909.

Alfred B. Haupt, B. C. C. (diploma), 1906; A.B., Johns Hopkins University, 1909; Instructor in Department of Mathematics, October, 1909.

George H. Schwartz, B. C. C. (diploma), 1905; A.B., Johns Hopkins University, 1908; Instructor in Department of English and Modern Languages, September, 1910.

Harry C. Finck, B. P. I. (diploma), 1906; Substitute in Department of Engineering, September, 1911; Instructor in Department of Engineering, January 1, 1914.

Howard H. Elliott, B. P. I. (diploma), 1911; Graduate Assistant in Department of Engineering, September, 1911; Science Laboratory Assistant, February 1, 1912.

Julius Zieget, B. P. I. (diploma), 1907; C.E., Cornell University, 1910; Instructor in Department of Engineering, February 1, 1912.

J. Vinton Hobbs, B. C. C. (diploma), 1894; M. S. N. S., 1897; Columbia University Summer School, 1907, 1908, 1909; Instructor in Department of Science, February 1, 1912.

Charles E. Adams, B. C. C. (diploma), 1898; Intermittent work at University of Chicago, 1906-1914; Instructor in Department of English and Modern Languages, March 1, 1912; Instructor in the Department of History and Civics, September, 1912.

E. Howard Askew, Science Laboratory Assistant, April, 1912.

Rosa Lebowitz, E. H. S. (diploma), 1911; Secretary, June, 1912.

Wilmer A. Dehuff, B. P. I. (diploma), 1907; C.E., Cornell University, 1910; Instructor in Department of Engineering, June, 1912.

Max F. Lehman, A.B., Lebanon Valley College, 1907; A.M., University of Pennsylvania, 1911; Instructor in Department of Mathematics, June, 1912.

Charles A. Pettit, B. P. I. (diploma), 1903; Instructor in Department of Engineering, June, 1912.

Harry Primrose Porter, A.B., Washington College (Md.), 1905; A.M., Columbia University, 1912; Instructor in Department of English and Modern Languages, August, 1912.

A. E. Sable, Cumberland Valley State Normal School (Pa.), (diploma), 1907; B.S., C.E., Bucknell University, 1911; Instructor in Department of Mathematics, August, 1912.

Charles F. Goob, B. P. I. (diploma), 1901; Laboratory Mechanician, September, 1912.

W. T. Ballard, B. P. I. (diploma), 1911; Cornell University, 1911-1912; Graduate Assistant, Department of Engineering, 1912-1913; Cornell University, 1913-1914.

Charles E. Dennis, Jr., B. P. I. (diploma), 1912; graduate Shop Assistant, Department of Engineering, 1912-1913; Graduate Assistant, Department of Engineering, 1913-1914.

James Neville Galloway, A.B., Randolph Macon College, 1908; Graduate Student, Johns Hopkins University, 1911-1912; Instructor in Department of Mathematics, October, 1912.

H. L. Caples, M. S. N. S., 1900; A.B., Johns Hopkins University, 1908; Instructor in Department of English and Modern Languages, February, 1913.

Ferdinand C. Kuehn, B. C. C. (diploma), 1908; A.B., Johns Hopkins University, 1911; Graduate Student, Johns Hopkins University; Substitute in Department of English and Modern Languages, February, 1913.

A. H. Chandler, B.S., A.B., Washington and Lee University, 1909, 1911; Student at Mass. Inst. of Technology, 1910; Instructor in Department of Mathematics, June, 1913.

George W. Ward, A.B., A.M., Western Maryland College, 1890, 1893; Ph.D., Johns Hopkins University, 1897; Instructor in Department of History and Civics, September, 1913.

John Curtis Richardson, A.B., A.M., Trinity College (N. C.), 1905, 1906; Graduate Student, University of Chicago, 1912-1913; Instructor in Department of English and Modern Languages, September, 1913.

William J. Miller, A.B., A.M., Harvard University, 1893, 1896; Substitute in Department of English and Modern Languages, September, 1913.

A. Beaumont Carpenter, E.E., Lehigh University, 1896; D.Sc., Villanova College, 1910; Instructor in Department of Science, September, 1913.

Walter Simon, B. P. I. (diploma), 1913; Graduate Shop Assistant, September, 1913.

Otto Hamm, B. P. I. (diploma), 1913; Graduate Shop Assistant, September, 1913.

Robert T. Greer, B. P. I. (diploma), 1913; Graduate Shop Assistant, September, 1913.

Charles Becker, B. P. I. (diploma), 1913; Graduate Shop Assistant, September, 1913.

Cyril Markley, B. P. I. (diploma), 1913; Graduate Shop Assistant, September, 1913.

Kenrick Kelly, B. P. I. (diploma), 1913; Graduate Shop Assistant, September, 1913.

Louis Meyerhoff, B. P. I. (diploma), 1913; Graduate Shop Assistant, September, 1913.

FACULTY.

WILLIAM R. KING,
Principal.

WILLIAM H. HALL,
Vice-Principal,
Head of Department of Science.

SAMUEL M. NORTH,
Head of Department of English and Modern Language.

HENRY A. CONVERSE,
Head of Department of Mathematics.

CHARLES E. CONWAY,
Head of Department of Engineering.

PHILIP DOUGHERTY,
Head of Department of History and Civics.

ROSA LEBOVITZ,
Secretary.

FACULTY AND STAFF BY DEPARTMENTS

IN ORDER OF APPOINTMENT.

DEPARTMENT OF ENGINEERING.

CHARLES E. CONWAY, *Head of Department.*
WILLIAM G. RICHARDSON,
GEORGE M. GAITHER,
SAMUEL P. PLATT,
ALLEN L. MALONE,
ALLAN B. SOUTHER,
HENRY BOGUE, JR.,
GEORGE N. ANDERSON,
CLARENCE P. BOLGIANO,
LAURANCE F. MAGNESS,
HARRY C. FINCK,
JULIUS ZIEGET,
WILMER A. DEHUFF,
CHARLES A. PETTIT,
CHARLES F. GOOB,
CHARLES E. DENNIS, JR.,
WALTER SIMON,
OTTO HAMM,
ROBERT T. GREER,
CHARLES A. BECKER,
CYRIL MARKLEY,
LOUIS MEYERHOFF,
KENRICK KELLY.

DEPARTMENT OF MATHEMATICS.

HENRY A. CONVERSE, *Head of Department.*
OLIVER BACHARACH,
HARVEY S. HOUSKEEPER,
THOMAS F. GAREY,
WILLIAM H. WILHELM,
ALFRED B. HAUPT,
MAX F. LEHMAN,
A. E. SABLE,
JAMES N. GALLOWAY,
A. H. CHANDLER.

DEPARTMENT OF SCIENCE.

WILLIAM H. HALL, *Head of Department.*
J. EDWARD BROADBELT,
IRVING L. TWILLEY,
J. VINTON HOBBS,
A. B. CARPENTER,
E. HOWARD ASKEW,
HOWARD H. ELLIOTT.

DEPARTMENT OF ENGLISH AND MODERN LANGUAGE.

SAMUEL M. NORTH, *Head of Department.*
J. WARD WILLSON,
EDWARD REISLER,
ELMER M. HARN,
WILLIAM P. STEDMAN,
GEORGE H. SCHWARTZ,
HARRY P. PORTER,
HARRY L. CAPLES,
FERDINAND C. KUEHN,
WILLIAM J. MILLER,
JOHN C. RICHARDSON.

DEPARTMENT OF HISTORY AND CIVICS.

PHILIP DOUGHERTY, *Head of Department.*
ISAAC L. OTIS,
CHARLES F. RANFT,
CHARLES E. ADAMS,
GEORGE W. WARD.

CALENDAR FOR SCOOL YEAR 1913-1914.

September 22, Monday.....Opening of Session.

November 21, Friday.....First Quarter ends.

November 24, Monday.....Second Quarter begins.

November 27, Thursday.....Thanksgiving Day.

December 24, Wednesday.....Christmas Vacation begins.

January 5, Monday.....Session resumed.

January 16, Friday.....Semi-annual Examination begin.

January 30, Friday.....Second Quarter ends.

February 2, Monday.....Third Quarter begins.

March 27, Friday.....Third Quarter ends.

March 30, Monday.....Fourth Quarter begins.

April 9, Thursday.....Easter Vacation begins.

April 14, Tuesday.....Session resumed.

April —, Friday.....Arbor Day.

May 20, Wednesday.....Annual Examinations begin.

June 16, Tuesday.....Commencement Day.

September 14, Monday.....Opening of Session.

November 20, Friday.....First Quarter ends.

November 23, Monday.....Second Quarter begins.

November 26, Thursday.....Thanksgiving Day.

December 24, Thursday.....Christmas Vacation begins.

COURSE OF STUDY AND GENERAL STATEMENT OF PLAN AND PURPOSE.

The primary aim of the Institute is to give its students something more than fundamental instruction in applied science. It aims to prepare for intelligent service in the engineering professions—the professions to which the world is indebted for all the conveniences of life and for the economic production of its necessities.

The course of study is designed to accomplish the following purposes:

1. To give a sound fundamental practical education to students whose inclinations and circumstances preclude a college course.

2. To give to youth that healthful and highly valuable manual training which broadens education and conduces to dexterity, contrivance, and invention.

3. To give to students in the third and fourth years such studies in Engineering, Mathematics, Physics, Chemistry, and such practical exercises at the machine, bench, forge, and in laboratories as will fit them:

(a) For immediate and remunerative employment in the wide field of civil, mechanical, electrical, chemical, and mining engineering, where their training will lead to rapid advancement.

(b) For entrance to advanced standing into higher institutions of technology, should a higher technical education be desired.

That these objects are being attained is abundantly proved by the experiences of the graduates who enter immediately into the activities of engineering life, and from the fact that

those graduates who enter higher institutions are invariably received to at least one year of advanced standing in the courses leading to the engineering degrees.

For the attainment of the objects of the course there is one carefully planned course of study, no effort being made to specialize until the fourth year, by which time a student will have acquired a considerable degree of practical skill and intimate knowledge in some one of the professions based on mechanical art and applied science that he may have elected to follow. Thus, in the fourth year in the subject of Design, the student may select examples of mechanical, electrical or civil engineering design, the amount of such practice being limited only by the capacity of the student and the time available. Extra opportunities in the laboratories are offered advanced students for more extended investigations than those demanded by the course.

No attempt is made to teach trades, but the equipment is of such nature that the instruction given in the shops necessarily results in the acquirement of a considerable degree of manual dexterity, though designed to be correlative to the work in the class room. It is believed that instruction in correct methods of using tools and practical illustrations of how, and for what purpose, things are done, are of more value than mere excellence in hand skill.

In the department of English and German, instruction in English is given throughout the four years, and in German throughout the first three. The course in English comprises the theory and practice of composition and the reading and study of selections from representative British and American authors, including the college entrance requirements. The work in composition is designed to give the student a practical knowledge of the ordinary forms of discourse and to train him in expressing his thoughts with ease and accuracy. To this end he is given frequent exercises in writing, the sub-

jects, for the most part, being taken from his daily experience and from his work in the other departments of the school. The course in literature is designed, not only to meet the college entrance requirements, but to cultivate in the student such tastes as will lead him in his reading to choose books that are worth while.

The course in German comprises drill in the fundamental principles of grammar, and as wide a reading in selected texts as is possible. The course is not designed to give a speaking knowledge of the language, but such knowledge as will enable the pupil to read German easily, and successfully to pursue advanced courses in the study of the language.

In the department of History and Civics, instruction is given during the first and second years. The course includes about one-half of the work prescribed by the Committee of Seven, the first year being devoted to English History, and the second year to American History and Civics.

In Mathematics, care is taken at the beginning of the first year to discover and correct defects in fundamental training, after which the course of instruction proceeds in Algebra, Geometry, Trigonometry, Analytic Geomerty, Descriptive Geometry and the Differential and Integral Calculus.

In the Department of Science, the work of the second year in Physics is the regular high school course, consisting of class room instruction and individual work in the laboratory, the laboratory practice being, as far as possible, conducted so as to permit all the students to perform the same experiment simultaneously. The Physics of the third year is more advanced and is really of college grade, the mathematical laws and derivation of formulas being prominent features. The laboratory work for this year is of a higher grade but the experiments are not performed simultaneously, the expensive nature of the apparatus limiting the equipment to one set for each experiment. The apparatus for laboratory work in

Physics is about the same as would be found in any well-equipped high school, with the addition of some pieces of better grade, such as a spectrometer, with micrometer scale; diffraction gratings; linear expansion apparatus; siren and other apparatus for study of sound. The tables are connected to gas supply and have conductors leading to the switchboard in the electrical laboratory, where connections may be made to supply current of any nature or voltage, all tables in this laboratory being connected, however, to the same supply at one time.

Electricity is treated as a distinct branch in the third and fourth years. The work of the third year is chiefly theoretical, the fundamental laws and principles being given careful consideration with the object of laying the foundation for practical applications in the fourth year. The laboratory work of the third year consists of tests tending to familiarize the student with the apparatus and especially with making connections according to diagram and with the proper interpretation of results. The work of the fourth year in electricity is of a commercial and practical nature. The direct current generator and motor are studied systematically, experimental determination of losses and efficiencies being emphasized. Commerical lighting, especially modern systems, is given a prominent place. The electric railway, including line and car equipment, is given about three weeks' time, which is sufficient for the essentials. The theory of the transformer is discussed, experiments performed to illustrate its action, tests made for losses, and efficiencies at various loads calculated, all of which is followed by a general discussion of its action under varying conditions.

The latter part of the fourth year is devoted to the study of alternating current generators, motors, and transmission and distribution. Calculations are made for generators, three-phase constants derived, transformer connections for

poly-phase lines shown, and the power of three-phase currents calculated. Under the head of distribution are considered some of the modern transforming and control appliances, such as the rotary converter, constant current transformer, mercury arc rectifier, and the feeder potential regulator.

The equipment for this work is partly in the Mechanical Laboratory, the main switchboard and the generator being especially adapted to experiment. This board is about twenty-five feet in length and has four generator panels, one meter panel, two motor panels, two lighting panels, one alternating current break-down panel, a gauge panel, and two brackets for voltmeters. All necessary instruments, switches and circuit breakers are supplied. The meter panel may be connected to any circuit and provides apparatus for the measurement of voltage, current, power and total energy. The lights of the building or any set of motors in the shops may be used as the load, or a water rheostat may be used independently. Each circuit is provided with a shunt, so that any meter may be connected across it, thus avoiding unnecessary duplication of instruments. The switchboard in the Electrical Laboratory is constructed on the plan of the old style series lighting boards, thus permitting the connections from any source of power to any table or class room. Three-wire, 220-110 volts, direct current is supplied from the power plant of the Institute. Outside current, three-phase, 110 volts, is also connected to the board. A 2 H. P. rotary converter is so connected as to supply either direct current when connected to the alternating, or vice versa, thus making the laboratory active when one source of supply is disconnected. A motor-generator set transforms alternating current to 25 volts direct. A mercury arc rectifier transforms alternating current to about 90 volts direct. A 2 H. P. direct current motor, with automatic starter, and a 2 H. P. three-phase motor are provided with a Prony brake for testing. The

storage battery room contains 25 chloride accumulators, giving a maximum of about 50 volts, and any lower voltage desired. This battery supplies current for the fire alarm system, the program bells, and for the telephones, and is used for battery supply to all tables requiring low voltage or steady supply. Apparatus is provided for tests for lamp resistance and efficiency, insulation resistance, line faults, permeability of iron and steel, transformer losses, instrument calibration, and other similar experiments. The newest and best methods of telegraph and telephone construction are presented, a new wireless telegraph of the Marconi type being part of the equipment.

The study of Chemistry is carried through one-half of the third year and through the fourth year. The regular high school course, with laboratory practice, is first presented. A course in calculations and in reactions, under the title of stoichiometry, is given during part of the fourth year, followed by chemical analysis during the remainder of the course. While the work in analysis is rather brief, it is fairly comprehensive. The aim of the qualitative work is to familiarize the student with the nature and reactions of the various bases and acids, first in solution and then in powder form, the student being required in the latter case to find the solvent and treat the substance properly. The quantitative work is first of a general nature and then leads to the analysis of steel and iron. The system used enables the instructor to give each student a solution of a different percentage composition without interfering in any manner with the fundamental principles. The commercial tests are used, rapidity and accuracy being combined. Analysis of producer and other gases, and the determination of carbon in steel, are thoroughly explained by experiment. The laboratory tables are of a standard type, supplied with water, gas, and with waste connections. The table of each student is connected to an

exhaust chamber for removing objectionable gases. The balances are located in a separate balance room, there being six of these instruments of different makes, all of good quality and high accuracy.

In the department of Engineering, the instruction given the fourth year students in theoretical and applied mechanics embraces the laws of equilibrium and of motion; center of gravity; friction; principles of work; moment of inertia; mechanics of materials; graphic methods of determining stresses in beams and in framed structures; and a study of the stresses and deformations produced in standard specimens of metal when subjected to tension, compression, and shearing. The work of the third and fourth year students in steam engineering consists of the study of the thermodynamics of the steam engine in a manner as comprehensive as the maturity of the student permits. Numerous calculations are made involving engine and boiler efficiencies and proportions, and the study of the indicator is supplemented with practice in taking diagrams, from which the consumption and distribution of the steam and the power of the engine are determined. The advantages and disadvantages of the different kinds of steam engines and boilers are studied, particular attention being given to engine and boiler attachments and accessories. A study of valve motions with the aid of the Zeuner diagram, and a study of the important modern methods of governing engines, as well as a brief study of the steam turbine, are all included in the course.

The work of the fourth year in gas engineering consists of a study of the modern types of internal combustion engines. The methods of producing the fuels, of preparing and igniting the charge, and of governing the engine are studied in succession.

The work of the fourth year in mechanical laboratory practice consists of thirty-six comprehensive tests designed to supplement the class room work in engineering subjects.

The plant for all this work consists of a 100 k. w. turbo-generator, a 100 k. w. Corliss driven generator, a 100 k. w. generator driven by a Buckeye cross compound engine (in course of construction by the students), a 25 k. w. generator driven by a high-speed automatic cut-off engine (Harrisburg Standard), an inverted triple expansion marine engine of 100 I. H. P., an inverted compound marine engine of 60 I. H. P., a horizontal Atlas engine of 25 I. H. P., a 30 H. P. gasoline engine of the Autocar type, a 20 H. P. Otto gas engine and producer plant, two Keeler boilers of 175 H. P. each, and a Roberts safety water tube boiler capable of generating steam for the production of 120 I. H. P. when used in connection with the triple expansion engine. The compound and triple expansion engines may be worked singly or together in connection with a friction dynamometer specially designed at the Institute, an internal circulation of water in the brake wheel enabling the engines to run continuously in making power tests. Five of the engines were built by the students, including the two marine engines after designs of the Bureau of Steam Engineering of the Navy Department.

Grouped in the mechanical laboratory are all the engines, the gas producer plant, a steam-engine-driven air compressor, a stem pump, an air pump, two surface condensers, a water motor, a weir tank and well, weighing tanks, a measuring tank, a modern testing floor, a Riehle torsional testing machine capable of testing specimens up to five feet in length and of one and one-half inches in diameter, a Riehle oil testing machine capable of measuring friction to the extent of 500 pounds, and a Riehle testing machine for tension and compression of 50,000 pounds capacity. There are also steam, gas and coal calorimeters; apparatus for the thermal

efficiency tests of steam traps, injectors and pumps; and apparatus for calibrating pressure gauges, thermometers, and indicator springs. Exhaustive engine, boiler, compressor, and turbine tests for power and efficiency are made by squads of fifteen of the senior class, the results of which are recorded in standard forms and retained by the students.

In the mechanical drawing rooms are 280 tables of approved design, and an equipment of instruments and models well adapted to the requirements of an advanced course in the subject. Third year students are required to make a free-hand sketch of the parts of some machine, from which a finished drawing, tracing, and blue print are made. The work of the fourth year students in design tends to make them draftsmen in the true sense—not mere copyists.

The equipment in the machine, pattern, forge, sheet metal. and carpentry shops, is equal to that of any similar institution in the country.

THE COURSE OF INSTRUCTION IN DETAIL.

The course extends over a period of 36 effective weeks of instruction, and as here outlined in detail applies to all entries after January 31, 1910, though the students in the Institute who entered previous to that date are pursuing an equivalent course. It is believed that the new arrangement will be more effective, as it advances the modern languages one year, that is, to the first, second and third years from the second, third and fourth; and concentrates physics in the second and third years in preference to distributing the subject through the first, second and third years.

Students completing the full course of the Institute invariably obtain full sophomore standing with some sophomore credits in the courses leading to the degrees of C.E., M.E., and E.E., at the leading technical universities of the country.

DEPARTMENT OF ENGINEERING AND APPLIED MECHANICS.

FIRST YEAR COURSE — D CLASS.

Mechanical Drawing.—36 weeks, 4 periods a week:
Use of instruments; lettering; elementary lessons.

Practice.—36 weeks, 4 periods a week:

(*a*) Carpentry; 18 weeks, 4 periods a week:
Lectures and exercises in laying out, cutting, framing, and joining wooden members.

(*b*) Sheet Metal; 18 weeks, 4 periods a week:
Lectures and exercises in soldering, and in sheet metal and venetian iron work.

SECOND YEAR COURSE — C CLASS.

Mechanical Drawing.—36 weeks, 4 periods a week:
Hatching; neatness and accuracy; scale drawing; intersection and development of surfaces.

Practice.—36 weeks, 4 periods a week:

(*a*) Carpentry; 5 weeks, 4 periods a week:
Review of the work of the first year.

(*b*) Pattern Making; 13 weeks, 4 periods a week:
Exercises in wood turning and in making simple patterns.

(*c*) Forge Work; 9 weeks, 4 periods a week:
Light forging and welding.

(*d*) Vise Work; 9 weeks; 4 periods a week:
Exercise in chipping and filing.

THIRD YEAR COURSE — B CLASS.

Steam Engineering.—36 weeks, 4 periods a week:

Types of boilers; boiler details; boiler room auxiliaries; the steam engine; engine details; indicating and governing; governors; valves; condensers; multiple expansion engines; theories of heat; thermo-dynamics; properties of perfect gases; properties of saturated steam; use of steam tables; combustion of fuel and steam generation; boiler and engine efficiencies; the engine mechanism; slide valve and link motion; duty and efficiency of pumps.

Mechanical Drawing.—36 weeks, 4 periods a week:

Detail drawings of machines from free-hand sketches; the working drawing, tracing, and blue print. Descriptive Geometry (see course in Mathematics).

Practice.—36 weeks, 4 periods a week:

(*a*) Pattern Shop; 18 weeks, 4 periods a week:
Exercises in making patterns for wrenches, pulleys, eccentrics, pillow-blocks, gears, globe valves, pipe joints, and core boxes where necessary. Lectures on construction and finish of patterns, on the different kinds of molding, and on the operation of the cupola.

(*b*) Machine Shop; 15 weeks, 4 periods a week:
Casehardening, and work on the lathe, planer, milling machine, drill-press, shaper, and vise.

(*c*) Forge Shop; 3 weeks, 4 periods a week:
Forging and tempering machine cutting tools.

FOURTH YEAR COURSE — A CLASS.

The Steam Engine.—22 weeks, 3 periods a week:

The indicator and indicator diagram; measurement of power and of steam consumption; expansion of perfect gases and steam; the ideal and actual engine; engine and boiler design; valve diagrams; engine and boiler testing; the steam turbine.

The Internal Cumbustion Engine.—14 Weeks, 3 periods a week:

Fuels, carburetors, vaporizers; ignition; cooling; lubrication; governing; indicator cards; efficiency; management; operation; defects and remedies; types of engines; gas producers.

Mechanics.—18 weeks, 5 periods a week:

Kinematics: Motion in a straight line with constant velocity and with constant acceleration; velocity and acceleration curves; vectors; resolution and composition of displacements, velocities, and accelerations; relative motion; acceleration with variation in direction of velocity; angular motion.

Dynamics: (a) Statics: The parallelogram, triangle, and polygon of forces; composition and resolution of forces; friction; the inclined plane; the screw; parallel forces; moments of forces and of couples; conditions of equilibrium; method of sections; equilibrium under the action of three forces; centre of gravity. (b) Kinetics: The laws of motion; inertia, mass, weight, momentum; work and power of a force and of a torque; potential and kinetic energy; principles of work; centrifugal and centripetal forces.

Mechanics of Materials.—18 weeks, 5 periods a week:

Stress, strain, elastic limit, ultimate strength; calculations involving bending and resisting moments, moment of inertia, radius of gyration, deflection and resilience of simple and cantilever beams and of columns and shafts; bending moment and shear diagrams.

Graphic methods of determining stresses in beams and framed structures by means of the funicular polygon and reciprocal diagram.

Mechanics of Machinery: Transmission of power by means of belts and toothed gears.

Mechanical Drawing and Design.—36 weeks, 4 periods a week:

Mechanical Drawing. The drafting accompanying the work in design; freehand sketches, working drawings, tracings and blue prints.

Design: Proportioning of machine parts, such as spur, bevel, and worm gearing, belt pulleys, and bearings, from empirical and rational formulas. The application of the mechanics of materials to the design of some part of an engine or tool, such as a traveling crane, cylinder, connecting rod, valve, screw jack. The use of the Zeuner diagram in valve design. The application of graphic statics to the design of roof trusses and bridge members. Students are permitted to select a subject for design from a list of mechanical and electrical devices submitted to them.

Practice.—36 weeks, 4 periods a week:

(*a*) Machine Shop; 18 weeks, 4 periods a week:

Machine work involving accuracy and finish, such as gear cutting, building and assembling of machinery.

(*b*) Engineering Laboratory; 18 weeks, 4 periods a week:

Tension, compression, bending, torsion, and oil tests with Riehle machines; calibration of pressure gauges, thermometers, and indicator springs; practice with planimeters; calorimeter tests for quality of steam; calorific value of coal and of gas; valve setting; determining clearances; duty of steam pumps; indicated steam consumption of engines; economy tests of steam and gas engines, air compressor, boilers, producer plant, water motors, pumps, and steam traps.

DEPARTMENT OF MATHEMATICS.

FIRST YEAR COURSE — D CLASS.

Algebra.—36 weeks, 4 periods a week:

Definitions and notation; fundamental operations; integral linear equations; factoring; highest common factor; least common multiple; fractions; fractional equations; simultaneous linear equations; graphical representation; inequalities; involution; evolution; theory of exponents; surds; quadratic equations.

Geometry.—36 weeks, 3 periods a week:

Geometry of the straight line and circle; proportion; properties of similar figures; original exercises.

Explanation and Demonstration.—36 weeks, 1 period a week:

The most difficult and important features of the course are explained and demonstrated.

SECOND YEAR COURSE — C CLASS.

Algebra.—36 weeks, 3 periods a week:

Review; theory of quadratic equations; variables and limits; indeterminate equations; ratio and proportion; logarithms; variation; arithmetical, geometrical, and harmonic progressions; binominal theorem; undetermined coefficients.

Geometry.—18 weeks, 3 periods a week, and 9 weeks, 4 periods a week:

Areas and volumes; lines and planes in space; polyhedrons; cylinder; cone; sphere; original exercises.

Trigonometry.—9 weeks, 4 periods a week:

Functions of the acute angle; the right triangle; use of tables; functions of any angle; relations between the functions of several angles; inverse trigonometric functions.

THIRD YEAR COURSE — B CLASS.

Trigonometry.—18 weeks, 3 periods a week:

General formulas; oblique triangle; miscellaneous examples.

Surveying.—18 weeks, 2 periods a week:

Instruments and their uses; land surveying.

Analytic Geometry.—36 weeks, 4 periods a week:

The straight line; circle; parabola; ellipse; hyperbola; transformation of co-ordinates; construction of loci; higher plane curves.

Descriptive Geometry.—Time taken from mechanical drawing, as it is taught in connection with that subject.

Projections; problems in straight line and plane; projections and sections of solids; curved surfaces and tangent planes; development and projection of screw thread; intersection of surfaces.

FOURTH YEAR COURSE — A CLASS.

Differential and Integral Calculus.—36 weeks, 5 periods a week:

Differentiation of algebraic and transcendental functions; successive differentiation; expansion of functions, including the development of Maclaurin's and of Taylor's theorems; evaluation of indeterminate forms; maxima and minima of functions of one variable, including geometric problems in maxima and minima; differentiation of functions of more than one variable; radius of curvature; tangents and normals; derivatives of arcs; fundamental rules and methods of integration; geometrical application of the calculus to lengths of curves, to areas, to volumes of solids of revolution; integration of trigonometric functions; successive integration; applications to mechanics.

DEPARTMENT OF SCIENCE.

SECOND YEAR COURSE — C CLASS.

General Physics.—36 weeks, 4 periods a week:

During this year the regular high school course in Physics is covered. Derivation of formulae and the solution of problems are required. Emphasis is laid upon such sections as have reference to engineering courses. Experimental demonstration by the instructor is made whenever the subject permits. One period a week is devoted to individual work in the laboratory.

THIRD YEAR COURSE — B CLASS.

Electricity.—36 weeks, 4 periods a week:

Magnetism; galvanometers and other measuring instruments; laws of electrical action; magnetic and electrical units; simple alternating currents; derivation of formulae and practical problems; experimental demonstration by the instructor; individual laboratory work in electrical measurements.

General Physics.—18 weeks, 3 periods a week:

The work in physics is confined principally to advanced study of light and sound, the subjects of dynamics and heat being embraced in the work of the Department of Engineering.

Chemistry.—18 weeks, 3 periods a week:

Recitations in general chemistry with experimental work by the instructor, showing the preparation and reactions of the elements and compounds. Individual work in the laboratory.

FOURTH YEAR COURSE — A CLASS.

Electricity.—36 weeks, 4 periods a week:

Lectures and recitations in applied electricity, including electrochemical action; principles of the generator, motor, and transformer; railways; line and machine testing; telegraph and telephone; electric lighting. One period a week is devoted to individual laboratory work in measurements, practical testing, and the operation of the generator, motor, and transformer.

Chemistry.—36 weeks, 4 periods a week:

General Chemistry: Practice in stoichiometry; lectures illustrating the theory of chemical action and emphasizing the parts of the subject bearing upon engineering work. Individual laboratory work.

Analytic Chemistry: Qualitative and quantitative analysis, the work of the fourth quarter consisting in the determinations of the substances affecting the quality of iron and steel.

DEPARTMENT OF ENGLISH AND MODERN LANGUAGES.

FIRST YEAR COURSE — D CLASS.

Composition and Rhetoric.—36 weeks, 2 periods a week:

Study of text and frequent written exercises based upon Narration and Description; letter writing.

Literature.—36 weeks, 3 periods a week:

(*a*) Study of the following selections: Sketch Book; Snow Bound, Tales of the White Hills; Poems and Tales from Poe; Sir Launfal; Lays of Ancient Rome; Lady of the Lake; Ivanhoe.

(*b*) Leading facts in the lives of the authors represented in (*a*).

German.—36 weeks. 4 periods a week:

Study of the grammar and reading.

SECOND YEAR COURSE — C CLASS.

Composition and Rhetoric.—36 weeks, 2 periods a week:

Frequent written exercises; study of rhetorical principles.

Literature.—36 weeks, 2 periods a week.

(*a*) Study of the following selections: Ancient Mariner; Vicar of Wakefield; Deserted Village; Silas Marner; DeCoverley Papers; Merchant of Venice; Palgrave (in part).

(*b*) Leading facts in the lives of the authors represented in (*a*).

German.—18 weeks, 4 periods a week; and 18 weeks, 3 periods a week:

Composition; grammar; reading standard German fiction and simple scientific prose.

THIRD YEAR COURSE — B CLASS.

Literature and Composition.—18 weeks, 2 periods a week; and 18 weeks, 3 periods a week:

Study of the following texts: Julius Caesar; Macbeth; Milton's L'Allegro, Il Penseroso, Lycidas, and Comus; Burke's Speech on Conciliation. Frequent written exercises.

German.—36 weeks, 3 periods a week:

Review of grammar and composition; copious reading in prose and poetry.

FOURTH YEAR COURSE — A CLASS.

Technical Composition.—36 weeks, 1 period a week.

Methods of exposition, and drill in the non-technical discussion of subjects taken from the students' work in the technical departments. Frequent conferences with instructors.

DEPARTMENT OF HISTORY AND CIVICS.

FIRST YEAR COURSE — D CLASS.

History.—36 weeks, 5 periods a week:

English History from its beginning to the present day. Especial attention is given to the social, economic, and political phases of the subject; and as far as time and maturity of the pupils permit, attention is directed to the development of Europe as it progressed contemporaneously with England.

SECOND YEAR COURSE — C CLASS.

History and Civics.—36 weeks, 4 periods a week:

American History, with special attention to political development; civil government of the United States and the rights and duties of American citizenship.

TIME DEVOTED TO THE DIFFERENT SUBJECTS COMPRISING THE FOUR YEAR COURSE.

	NUMBER OF HOURS PER YEAR.				
	1st Year	2nd Year	3rd Year.	4th Year.	Aggregate
DEPARTMENT OF ENGINEERING.					
Carpentry	72	20	.....	.....	92
Sheet Metal	72	.....	.....	.....	72
Vise	.....	36	.....	.....	36
Forge	.....	36	24	.....	60
Pattern	.....	52	72	.....	124
Machine	.....	.....	48	72	120
Mechanical Laboratory	.....	.....	.....	72	72
Mechanical Drawing	144	144	108	.....	396
Descriptive Geometry	.....	.....	36	.....	36
Machine Design	.....	.....	.....	144	144
Steam and Gas Engines	.....	.....	144	108	252
Mechanics	.....	.....	.....	90	90
Mechanics of Materials	.....	.....	.....	90	90
DEPARTMENT OF MATHEMATICS					
Algebra	144	108	.....	.....	252
Geometry	108	90	.....	.....	198
Geometry, Analytic	.....	.....	144	.....	144
Trigonometry	.....	36	54	.....	90
Surveying	.....	.....	36	.....	36
Calculus, Differential	.....	.....	.....	90	90
Calculus, Integral	.....	.....	.....	90	90
Explanation and Demonstration	36	.....	.....	.....	36
DEPARTMENT OF SCIENCE					
Physics	.....	108	54	.....	162
Physics, Laboratory	.....	36	.....	.....	36
Electricity	.....	.....	72	108	180
Electricity, Laboratory	.....	.....	36	36	72
Chemistry, General	.....	.....	36	54	90
Chemistry, Laboratory	.....	.....	18	18	36
Chemistry, Analytic	.....	.....	.....	72	72
DEPARTMENT OF ENGLISH.					
Composition and Rhetoric	72	72	.....	.....	144
Literature	108	72	90	.....	270
German	144	126	108	.....	378
Technical Composition	.....	.....	.....	36	36
DEPARTMENT OF HISTORY AND CIVICS					
History	180	....	.....	.....	180
History and Civics	.....	144	.....	.....	144
Total	1080	1080	1080	1080	4320

REQUIREMENTS FOR ADMISSION.

Pupils bearing properly attested certificates of having passed the prescribed Grammar School Course of the Public School System of Baltimore are entitled to enrollment.

Other applicants residing in the city will be admitted after passing an examination covering the requirements of the eighth grammar school grade. Eighth grade grammar school pupils who fail of promotion are not eligible for admission under this requirement. Specimen entrance examination papers covering the requirements of the eighth grade will be found on pages and .

After having successfully passed the entrance examination, a non-resident applicant must register as such at the office of the Secretary of the Board of School Commissioners, where he will be furnished with a bill for the first quarterly installment of the annual fee of $85, and a presentation at the Institute of a coupon from the bill, signed by the City Comptroller, will be accepted as evidence of payment, and entitle the applicant to enrollment.

MERIT ROLLS.

Merit rolls, showing the proficiency of students in each branch of study, are made out annually for the different classes.

Each subject is assigned a coefficient indicative of its relative weight, and the final mark of a student in a subject (on a scale of 100) is multiplied by its coefficient. The sum of the products thus obtained is the final mark of the student in all the subjects for the year. This mark is a certain percentage of the sum of the coefficients, and such percentage is the student's average for the year.

BALTIMORE POLYTECHNIC INSTITUTE.

Fourth Year Record and Final Merit Roll of the Mid-Year Graduating Class of 1913.

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mech. Applied to Engineering.	Steam and Gas Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
*1	A. Bacharach.....	1909	6.80	8.40	10.56	6.24	9.30	6.32	8.10	3.64	4.35	5.00	17.66	35.35	53.09	68.91	175.41	87.71
28	L. A. Baldwin.....	1908	6.24	8.20	9.00	6.56	7.80	5.76	7.00	2.88	3.65	0.85	15.39	31.33	45.72	57.94	150.32	75.16
18	J. C. Bartholow...	1908	5.60	9.10	9.60	5.92	8.30	5.84	9.10	2.80	4.30	2.60	15.74	30.41	43.87	63.16	153.18	76.59
6	C. E. Boone.....	1909	6.64	9.20	10.20	6.32	8.00	6.08	8.30	3.44	4.30	3.00	16.90	29.61	49.34	65.48	161.33	80.67
35	L. A. Brodie.....	1909	5.92	7.90	9.48	5.60	8.50	5.60	7.00	2.80	3.55	–1.55	16.30	31.92	46.96	54.80	149.98	74.99
29	E. A. Constam.....	1907	5.60	7.00	9.00	6.08	7.60	5.84	8.00	3.00	3.80	5.00	13.91	29.80	45.46	60.92	150.09	75.05
32	H. G. Danzig.....	1907	5.60	7.00	8.64	6.16	7.70	5.92	8.30	3.60	4.10	–5.25	16.73	32.70	43.55	51.77	144.75	72.38
5	E. S. Davis.....	1909	6.56	8.00	8.88	6.00	8.00	5.00	8.30	2.80	4.10	5.00	16.55	32.62	49.03	63.24	161.44	80.72
19	E. Elgert.....	1908	6.32	7.00	9.48	6.48	8.00	5.92	7.50	3.48	3.85	5.00	14.56	29.49	45.84	63.03	152.92	76.46
10	C. L. Garrett.....	1908	6.40	8.20	9.96	6.16	7.10	6.08	9.30	2.80	4.30	5.00	14.04	30.83	49.43	65.30	158.60	79.30
8	E. A. Hampson....	1909	6.48	7.00	9.00	5.92	8.20	6.24	8.40	3.16	3.95	3.95	16.46	33.43	47.87	62.90	160.66	80.33
16	J. N. Heiner.....	1909	6.56	7.30	9.36	5.92	7.00	5.92	7.70	3.08	4.10	3.95	16.50	31.10	46.18	60.89	154.67	77.34

BALTIMORE POLYTECHNIC INSTITUTE.

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF THE MID-YEAR GRADUATING CLASS OF 1913 (*Continued*).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mech. Applied to Engineering.	Steam and Gas Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
11	W. Hess	1909	6.32	8.40	8.76	6.56	7.50	5.60	7.00	2.80	4.05	5.00	15.53	32.02	47.99	61.99	157.53	78.77
27	J. E. Hopkins	1908	5.60	7.60	9.24	6.00	8.00	5.92	8.70	2.84	3.60	2.70	15.88	31.13	43.58	60.20	150.79	75.40
12	I. Isaacs	1909	5.92	7.90	9.72	5.84	8.40	6.08	7.80	3.12	3.75	4.50	16.70	32.42	45.37	63.03	157.52	78.76
17	E. E. Kaiser	1909	6.08	7.50	9.12	6.48	7.50	5.68	7.30	2.84	3.85	3.90	15.89	30.28	47.39	60.25	153.81	76.91
*2	C. L. Kasper	1909	6.80	8.40	10.92	6.72	8.40	5.68	8.60	3.68	4.25	5.00	17.23	34.83	52.34	68.45	192.85	86.43
9	W. J. Kellinger	1909	6.13	7.30	10.08	6.24	8.00	5.76	7.50	2.88	4.05	5.00	17.46	31.98	47.63	62.97	160.04	80.02
20	H. Korff	1908	5.92	7.40	8.64	6.56	7.80	5.60	7.00	3.16	3.80	4.30	14.88	31.21	46.63	60.18	152.90	76.45
23	B. Lasinsky	1908	6.08	7.10	9.00	5.60	8.30	5.84	7.70	3.64	3.60	3.40	15.33	31.68	44.77	60.26	152.04	76.02
30	L. J. Lenderking, Jr	1908	6.16	7.50	9.36	5.92	7.30	5.84	7.80	3.32	3.60	2.45	15.76	29.54	44.32	59.25	148.87	74.44
13	J. Levine	1909	5.76	7.80	9.00	6.24	8.60	5.84	7.40	3.48	3.60	4.00	17.63	34.21	43.93	61.72	157.49	78.75
34	F. Lentz	1908	6.56	7.00	8.52	6.00	7.50	5.60	7.00	3.16	3.60	4.95	14.87	31.74	45.35	59.89	151.85	75.93
24	F. Lucke	1908	5.92	7.20	9.12	6.08	7.70	5.92	7.70	3.00	4.10	4.70	15.50	29.96	45.11	61.44	152.01	76.01

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF THE MID-YEAR GRADUATING CLASS of 1913 (*Concluded*).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mech. Applied to Engineering.	Steam and Gas Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
7	P. B. Milburn.....	1908	6.40	8.10	8.88	6.96	7.50	6.00	7.90	3.16	3.95	5.00	16.34	31.85	49.08	63.85	161.12	80.56
22	W. R. Moore, Jr..	1908	6.08	7.30	9.00	6.24	7.00	5.92	7.10	2.96	3.75	2.30	15.30	31.99	47.30	57.65	152.24	76.12
*3	C. Morrison.....	1909	7.00	8.20	10.20	6.16	8.50	6.16	8.40	3.36	4.05	4.75	18.12	35.12	50.99	67.38	171.61	85.81
25	S. C. Pruett.....	1908	6.48	7.00	9.00	6.56	7.50	6.08	7.10	3.00	4.10	3.00	14.72	30.39	44.70	61.62	151.43	75.72
15	C. L. Pumphrey...	1909	6.16	7.70	9.00	6.00	7.80	5.68	7.00	3.12	3.75	5.00	15.20	31.04	47.71	61.81	155.76	77.88
14	M. C. Smith.....	1909	5.00	8.00	10.20	5.92	7.50	5.00	7.00	3.00	3.00	5.00	16.39	31.37	46.72	62.62	157.10	78.55
4	B. J. Trautman....	1909	6.64	8.00	9.72	6.16	8.70	5.76	7.80	3.08	4.05	5.00	15.81	32.82	48.67	65.51	162.81	81.42
25	S. S. Unglaub.....	1908	5.00	7.00	8.64	5.92	7.10	5.00	7.10	3.12	3.95	4.20	15.89	31.62	45.09	58.83	151.43	75.72
33	C. Walker.....	1908	5.00	7.50	8.76	5.84	7.00	5.76	7.80	2.92	3.50	4.10	16.29	29.88	42.85	53.58	142.60	71.30
21	W. F. Walker, Jr..	1908	6.16	7.00	8.88	6.56	7.00	5.60	7.70	2.80	3.55	4.50	15.87	30.63	46.62	59.75	152.87	76.44
31	E. Wood.....	1909	5.00	7.10	8.40	5.84	7.00	5.00	7.40	2.96	3.70	1.95	16.25	30.78	44 44	55.55	147.02	73.51

*Received 85% or more of the aggregate multiple for the entire course.

BALTIMORE POLYTECHNIC INSTITUTE.

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF GRADUATING CLASS OF 1913.

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mechanics of Materials.	Steam Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
36	W. T. Abercrombie.	1909	5.60	7.00	9.36	6.48	7.20	6.16	8.70	3.00	4.15	5.00	15.23	31.23	47.98	62.65	157.09	78.55
**67	L. W. Ashley.....	1909	5.60	7.00	8.88	6.08	7.40	5.60	7.80	2.96	3.80	4.70	14.79	31.42	47.39	59.82	153.42	76.71
**69	R. K. Barnes.....	1909	5.60	7.00	9.12	5.60	7.20	5.60	7.70	2.80	3.70	5.00	15.37	30.10	42.78	59.32	147.57	73.79
31	R. Beaumont.....	1909	5.60	7.00	9.00	7.12	8.00	5.68	7.90	2.96	3.95	4.40	16.76	33.32	49.08	61.61	160.77	80.39
25	C. A. Becker.....	1909	5.84	8.20	8.88	6.32	7.80	6.40	8.30	3.68	4.05	3.15	17.38	33.72	49.04	62.62	162.76	81.38
45	J. M. Boyer.....	1909	5.60	7.00	9.12	6.72	7.00	5.60	7.00	2.96	4.05	5.00	15.87	30.79	47.16	60.05	153.87	76.94
18	A. C. Carlton.....	1909	5.84	8.30	9.36	6.40	7.00	7.44	9.10	3.00	4.00	5.00	17.19	33.68	49.33	65.44	165.67	82.84
57	F. H. Carter.....	1908	6.24	8.00	9.60	6.24	7.00	5.84	8.10	3.04	4.15	2.20	15.16	30.15	43.52	60.41	149.24	74.62
44	S. Cohen.....	1909	5.60	7.10	8.40	6.16	7.50	5.60	7.20	2.96	3.70	5.00	16.38	31.83	46.76	59.22	154.19	77.10
53	H. A. Collett.....	1908	5.60	7.00	9.00	6.32	7.30	5.84	7.30	3.48	4.00	2.15	15.30	31.31	46.09	57.99	150.69	75.35
57	L. E. Collins.....	1909	5.68	7.00	8.64	6.16	7.00	5.68	7.20	3.04	3.85	3.45	14.53	30.71	46.29	57.70	149.23	74.62

BALTIMORE POLYTECHNIC INSTITUTE.

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF GRADUATING CLASS OF 1913 (*Continued*).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mechanics of Materials.	Steam Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
38	P. Davis.....	1909	5.60	7.10	9.84	6.80	7.20	5.60	7.40	3.08	4.10	4.50	15.68	32.23	47.51	61.22	156.64	78.32
15	C. E. Earle.....	1909	6.96	8.40	10.08	6.72	8.10	6.48	8.20	3.04	4.35	5.00	16.49	32.88	49.76	67.33	166.46	83.23
33	G. F. Gephart.....	1909	6.24	8.20	10.80	6.96	7.80	5.60	8.20	3.60	3.85	5.20	16.13	32.18	47.86	64.45	160.62	80.31
24	L. S. Gilpatrick....	1909	6.40	8.10	10.44	6.80	8.00	5.60	8.00	3.00	3.70	3.15	16.40	33.27	50.19	63.19	163.05	81.53
40	B. Goldberg.....	1909	5.60	7.20	9.60	6.32	7.30	5.60	7.70	3.32	3.75	5.00	16.88	30.61	47.17	61.39	156.05	78.03
66	H. A. Goldberg....	1908	5.68	7.00	8.52	6.08	7.40	5.60	7.30	2.80	3.95	1.10	14.72	28.02	42.42	53.23	138.39	69.20
39	W. McL. Graham..	1909	5.60	8.00	10.08	6.96	7.00	5.60	7.20	3.04	3.75	5.00	15.31	31.48	47.31	62.23	156.33	78.17
34	C. H. Grauling....	1909	5.60	7.10	9.48	6.80	7.00	6.32	8.20	3.56	4.25	5.00	14.81	32.86	48.09	63.31	159.07	79.54
26	R. T. Greer.....	1909	5.60	7.40	9.84	6.72	7.70	6.32	8.20	2.96	4.05	5.00	16.42	32.62	49.49	63.79	162.32	81.16
12	C. F. Gross.....	1909	6.96	8.90	10.92	7.04	7.00	6.40	8.80	2.88	4.50	5.00	16.52	32.95	49.21	68.40	167.08	83.54
19	R. F. Gunts.....	1909	6.72	8.10	9.84	6.32	8.70	6.64	8.70	3.20	4.15	5.00	15.38	32.76	49.99	67.37	165.50	82.75

BALTIMORE POLYTECHNIC INSTITUTE.

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF GRADUATING CLASS OF 1913 (*Continued*).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mechanics of Materials.	Steam Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
17	G. K. Haderman...	1909	6.64	7.20	9.48	6.56	8.00	6.96	8.80	3.00	4.40	5.00	16.69	33.20	49.99	66.04	165.92	82.96
50	O. H. Hamm.....	1909	5.60	7.10	9.36	6.72	7.60	5.92	8.00	2.96	4.10	3.05	14.64	31.43	45.69	60.41	152.17	76.09
52	W. Harrison.....	1909	6.00	7.00	9.24	6.64	7.90	5.60	7.20	2.92	3.85	1.45	16.94	31.11	45.47	57.80	151.32	75.66
21	W. Heaphy.....	1909	6.72	8.10	10.32	6.48	7.70	6.00	8.30	3.16	4.20	4.15	16.27	33.39	49.59	65.13	164.38	82.19
27	C. A. Hechmer.....	1909	5.60	8.20	10.08	7.20	7.10	6.00	7.60	3.00	4.25	5.00	16.76	32.85	48.04	64.03	161.68	80.84
55	C. W. Heisse.....	1908	5.60	8.60	9.12	6.24	7.10	5.76	8.30	3.32	3.75	3.00	15.70	30.17	42.86	60.79	149.52	74.76
63	R. H. Hicks.....	1909	5.84	7.00	8.40	5.84	7.00	5.76	7.00	2.92	3.80	4.70	13.99	30.03	45.20	58.26	147.48	73.74
*6	J. B. Hill.....	1909	6.88	8.90	10.08	6.96	8.40	6.80	8.40	3.12	4.30	4.30	17.37	34.35	50.79	68.14	170.65	85.33
42	I. H. Hofmann....	1909	6.24	7.50	9.96	6.48	7.20	5.68	7.80	3.04	4.00	4.40	15.24	31.53	46.70	62.30	155.77	77.89
22	I. L. Houghton....	1909	5.60	7.50	9.12	6.24	7.00	6.48	8.20	3.32	4.25	5.00	17.48	34.37	48.79	62.71	163.35	81.68
65	L. S. Houghton....	1908	5.60	7.00	8.76	6.48	7.60	5.68	7.80	3.44	3.95	-0.85	15.29	29.15	42.64	55.46	142.54	71.27

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF GRADUATING CLASS OF 1913 (*Continued*).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mechanics of Materials.	Steam Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
37	E. Y. Johnson.....	1909	6.40	8.20	9.24	6.64	7.30	6.16	8.80	3.24	3.85	4.65	14.64	30.56	57.29	64.48	156.97	78.49
62	K. Kelly.....	1908	5.60	7.40	8.40	6.56	7.40	6.16	7.30	2.80	3.50	0.10	17.52	29.63	45.16	55.22	147.53	73.77
10	F. Kuehle.....	1909	6.80	8.90	10.92	6.48	8.40	6.40	9.00	3.24	4.25	4.75	16.79	33.01	50.50	68.14	168.44	84.22
56	W. F. Leineweber..	1909	5.60	7.40	8.64	5.92	8.00	6.00	7.40	2.80	3.50	3.75	15.42	29.96	45.07	59.01	149.46	74.73
32	J. Levin.....	1909	6.16	7.50	9.36	6.80	8.30	6.48	7.90	3.48	4.25	3.95	16.15	32.33	48.08	64.18	160.74	80.37
51	A. C. Levis.....	1909	5.60	7.00	9.36	6.16	7.00	5.85	7.30	2.80	3.95	5.00	15.58	30.98	44.81	60.01	151.38	75.69
54	J. W. McAllister...	1909	5.60	7.00	8.52	5.60	7.00	5.60	7.60	2.80	3.65	4.50	15.14	31.36	45.85	57.87	150.22	75.11
*2	A. S. McCabe.....	1909	7.44	9.00	11.52	7.04	9.20	7.20	9.50	3.32	4.70	4.50	17.27	35.51	54.23	73.42	180.43	90.22
*7	C. Markley.....	1909	6.88	8.50	10.32	6.72	8.40	6.72	8.20	3.44	4.35	5.00	17.48	34.14	50.11	68.53	170.26	85.13
*4	L. Meyerhoff.....	1909	7.76	9.40	10.92	6.96	9.40	6.96	9.40	3.68	4.00	4.65	15.85	34.40	51.67	73.13	175.05	87.53
49	W. T. Meushaw....	1909	6.24	7.30	9.00	5.92	7.00	5.84	7.30	3.12	3.75	4.70	14.99	31.49	46.05	60.17	152.70	76.35

BALTIMORE POLYTECHNIC INSTITUTE.

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF GRADUATING CLASS OF 1913 (*Continued*).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mechanics of Materials.	Steam Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
60	H. Miller.....	1909	5.84	7.30	8.88	6.32	7.20	5.84	8.00	3.28	3.75	2.35	15.76	25.95	47.29	58.76	147.76	73.88
43	L. W. Miller.....	1909	5.60	7.00	8.40	6.48	7.10	5.92	7.40	2.88	3.75	5.00	15.33	32.45	47.30	59.53	154.61	77.31
20	W. H. Osbourn....	1909	6.16	7.90	9.48	6.48	8.10	6.24	7.80	2.80	3.95	5.00	17.05	34.60	49.62	63.91	165.18	82.59
35	V. Panettiere.....	1909	5.92	7.20	10.80	7.04	7.00	5.68	7.50	3.08	4.00	4.70	15.93	32.07	47.34	62.92	158.26	79.13
48	I. Poloway.....	1909	5.68	7.30	9.48	6.72	7.00	6.08	7.10	3.28	3.90	3.45	15.84	30.11	46.96	59.99	152.90	76.45
29	O. B. Pyle.....	1909	6.24	7.60	9.84	6.80	7.00	6.40	7.50	2.88	4.00	5.00	16.22	32.98	49.00	63.26	161.46	80.73
64	A. J. Quinan.....	1908	6.32	7.10	9.00	6.08	7.10	5.60	7.20	3.08	4.05	3.35	15.42	27.04	45.57	58.88	146.91	73.46
8	R. Ramirez.....	1909	6.88	7.70	10.20	6.24	8.90	6.48	8.60	3.12	3.95	4.50	17.02	34.53	50.80	66.57	168.90	84.45
46	M. Reiner.....	1909	5.60	8.00	9.24	6.48	7.00	6.16	8.30	3.32	3.80	2.85	15.92	31.31	45.86	60.75	153.84	76.92
13	F. G. Reinhardt...	1909	6.24	7.00	9.72	6.48	7.50	6.32	8.30	3 52	4.15	5.00	17.02	34.76	50.26	64.23	166.87	83.44
30	L. T. Reinicker....	1909	6.24	8.50	9.48	6.80	8.30	6.08	7.90	2.92	3.55	5.00	16.08	31.42	48.89	64.77	161.16	80.58

BALTIMORE POLYTECHNIC INSTITUTE.

Fourth Year Record and Final Merit Roll of Graduating Class of 1913 (Continued).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mechanics of Materials.	Steam Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	Maxima.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
59	C. E. Reynolds....	1907	5.60	7.40	9.60	6.24	7.00	5.92	7.90	2.84	3.95	3.40	15.33	31.47	42.56	59.85	149.21	74.61
23	L. Sebald.....	1909	6.00	7.40	9.84	6.48	8.40	6.00	8.00	2.92	3.85	5.00	17.36	33.01	49.07	63.89	163.33	81.67
47	J. J. Seidel.....	1909	5.76	7.00	9.12	6.08	7.30	5.60	8.00	3.44	3.65	4.00	15.74	30.03	47.75	59.95	153.47	76.74
*3	R. W. Sheckells...	1909	7.20	9.00	10.80	6.80	9.50	7.20	8.80	3.28	4.55	5.00	17.99	35.32	52.18	72.13	177.62	88.81
11	W. G. Simon.....	1909	7.12	8.10	10.56	7.20	7.60	6.24	9.10	3.44	4.45	5.00	16.52	31.79	51.18	68.81	168.30	84.15
28	C. Sinclair.....	1909	6.40	7.20	9.48	6.56	7.30	6.00	8.50	3.12	3.80	5.00	15.45	32.69	49.14	63.36	161.64	80.82
13	J. Sindler.....	1909	5.60	7.80	8.88	6.80	8.50	6.80	8.00	3.24	3.75	5.00	18.10	34.70	49.70	64.37	166.87	83.44
61	S. LeR. Thomas...	1908	5.60	7.80	9.00	6.56	7.00	5.60	8.40	2.96	3.95	0.00	15.74	31.39	43.10	57.47	147.70	73.85
**68	E. Tschudy.....	1909	5.60	7.00	8.76	6.32	7.00	6.00	7.00	2.92	3.55	2.10	16.01	31.09	44.83	56.85	149.38	74.69
*1	H. Wacker.....	1909	7.44	9.30	11.52	6.88	8.80	7.20	9.30	3.48	4.30	5.00	17.77	35.75	54.70	73.22	181.44	90.72
†70	W. N. Wherrett....	1909	5.60	7.26	8.88	6.24	7.00	5.68	7.50	2.96	3.95	5.00	15.69	31.82	47.27	60.01	154.79	77.40

BALTIMORE POLYTECHNIC INSTITUTE.

FOURTH YEAR RECORD AND FINAL MERIT ROLL OF GRADUATING CLASS OF 1913 (*Concluded*).

Order of Merit.	NAMES.	Date of Admission.	Mechanics.	Mechanics of Materials.	Steam Engineering.	Mech. Drawing and Design.	Diff. and Integral Calculus.	Chemistry.	Applied Electricity.	German.	Practice.	Deportment.	Aggregate for 1st Year.	Aggregate for 2nd Year.	Aggregate for 3rd Year.	Aggregate for 4th Year.	Aggregate for Four Years.	Graduating Average.
	MAXIMA.		8	10	12	8	10	8	10	4	5	5	20	40	60	80	200	100
40	W. H. Wilhelm....	1909	6.00	7.80	9.00	6.64	7.30	5.64	7.10	2.92	3.55	4.15	16.10	32.69	47.24	60.02	156.05	78.03
*5	J. A. Williams.....	1909	6.56	8.40	10.56	7.36	8.30	6.88	8.70	3.20	4.85	4.00	17.96	34.97	52.84	68.81	174.58	87.29
16	W. C. Wroe.....	1909	6.48	7.90	9.12	6.96	7.60	6.16	8.40	2.92	3.90	4.85	17.16	34.37	50.14	64.29	165.96	82.98
9	E. H. Ziefle.....	1909	7.20	8.10	10.80	7.04	8.60	6.96	9.00	3.52	4.25	5.00	15.81	31.61	50.94	70.47	168.83	84.42

*Received 85% or more of the aggregate multiple for the entire course.
**Deficient in Mechanics of Materials; deficiency made up in September and diploma awarded.
†Deficient in Calculus; deficiency made up in September and diploma awarded.

ADDRESS TO GRADUATES

THE PROPER CONCEPTION OF THE ENGINEER'S FUNCTION.

Address to the Graduating Class of the Baltimore Polytechnic Institute June 17, 1913.

By J. E. Griner.

This is an important day to you members of the graduating class. You are the main factors here. The day perhaps is no more important than any other day to the rest of us who here play a part. We are only incidental to the occasion. But, we remember another commencement when we were main factors full of our own importance, just as you are now, and we are not as yet too *passe* to fully appreciate your spirit of gratification. May your importance as factors during this age of the manufacture of power become, in the near future, no less than your importance during this commencement day.

It is the intention of a number of you to prepare yourselves for that most virile profession of the engineer. All of you will be interested in his work. Are you sure you know what an engineer is? The popular understanding is rather confused and you yourselves may have but a vague idea of what he does, therefore the last word this evening will be an endeavor to impress upon you "The proper conception of the engineer's function."

Half a century ago engineering was still considered as a branch of the building art, its practice being largely empirical. When the *educated* engineer began to have recognition as a factor, he was mainly a theorist or a technician with skill in grasping details and with ingenuity in solving problems.

Now, the real engineer is an essential productive power back of all utilitarian developments.. A large part of the general public, however, has an impression that he is the man behind a surveying instrument, the man who estimates quantities, or makes drawings or inspects materials. It does not understand him or his labors or his part in the affairs of men and is inclined to regard his vocation as one that can be learned in about the same manner as a trade.

Other learned professions deal with *individual* men, their personal rights, diseases and faiths. The engineer deals with inanimate forces for the use and convenience of the *community.* He does nothing for the person of the individual—he does not plead his cause, cure his disease or direct his worship, consequently the general public is not influenced by his personal contact, as it is by its personal relations with these other professional men. It is not able to distinguish the

real engineers from the others, and receives an erroneous impression of engineering and engineers from the character of work done by, and the personal qualities of, a large number of men who, because they play a part in engineering work, call themselves engineers.

If we examine into the conditions which accompany the practice of medicine and law we find many helpers who assist in an essential way the work of the doctor and lawyer. Similar conditions accompany the practice of engineering. There are many men who, while helping in engineering work, occupy the same relative positions in connection therewith as do the doctor's assistants in connection with the practice of medicine and the lawyer's clerks in connection with the practice of law. There is, however, this difference—the lawyer's and doctor's helpers do not call themselves lawyers and doctors until fully qualified and authorized, while the engineer's helpers may by sufference call themselves engineers. Such conditions which permit the assumption of the title of engineer by anybody have given some people the opinion that engineering is but a *quasi* profession.

These erroneous impressions are due to the fact that there is no general authoritative regulation which will prevent a man, regardless of his competence or incompetence, or his character, or his occupation, from calling himself an engineer if he so desires. The public should not be blamed for these impressions since the responsibility rests with the engineer himself, who has thus far failed to draw definite lines of demarcation.

In order that we may have a proper conception of the engineer's function we must look beyond the men who are but units employed in narrow duties along the borders of engineering, and confine attention to the men who stamp the true character of the profession, those fully developed men who are controlling figures in the midst of things.

Probably the first man who signed his name as "civil engineer" was John Smeaton, who is considered the originator of that term in English-speaking countries. This was about one hundred and thirty years ago. A little later the engineer's operations became so diversified that there were fairly well defined lines of demarcation between several distinctive kinds of work until finally there emerged the mechanical, electrical and mining engineers, who left to the parent "civil" all other work except that embraced in these special groups. Each of these four groups has now its particular field, but although more or less separate, the borders are not definitely drawn, since they are all closely connected and merge into each other. It is now necessary for those who desire proficiency to confine their work largely to certain branches of one of these four main groups, to become particularly well skilled and thorough therein, and yet to have a general knowledge of all other branches. They become the specialists known as

bridge, sanitary, sewerage, water, railroad, locating, constructing and other engineers, all of whom are still civil engineers, whatever may be their particular function and whatever distinctive titles they may assume.

The consulting engineer is properly one who has gained by ability and experience that professional reputation which qualifies him to act in an advisory capacity with other engineers, to design and construct special, difficult or complicated work, and to investigate, analyze, and report upon existing conditions or new projects. He may be a specialist in any branch of the four main groups, free to act wherever his services may be required, but always in a strictly fiduciary capacity, uninfluenced by any personal business or commercial interests, and without any profit, compensation, or benefit other than his direct charge for the services rendered. He is essentially professional, and is made by long experience, special skill and acceptable personality, not by painting his name on an office door or by sending out announcement cards.

Modern industrial corporations require as important factors the services of broad-minded men. In such industries success or failure depends upon the trained intellect, the executive ability and the comprehensive grasp of the men at the head. Ordinary business men, financiers and lawyers, can not successfully manage such industries, or efficiently administer affairs, without the aid of men, who by training and education understand thoroughly the character of the things dealt with, most of which are based on engineering economics of construction and operation.

In the commercial field there are employed men whose duties are to manage sales departments or to sell industrial appliances or commodities or materials of an engineering nature or used in engineering work. These men may not be *doing* things in an *engineering* sense, they are *selling* things in a *commercial* sense. But engineering training in connection with good commercial instinct is a strong combination which is receiving most favorable recognition by business interests.

Firms of engineers undertake both engineering and contracting and some add financing of projects as well. Banks and financiers retain specialists for investigating and reporting upon projects. In fact, in all undertakings where the conception, improvement or development of utility appliances and works are concerned, and where their construction, maintenance and operation are economically conducted, there is always the engineer in charge, or the engineer whose influence directs and advises those who may appear to the public as the controlling heads.

What, then, is an engineer? Certain sources of power in nature have been apprehended by scientists—the men of research, who have evolved the laws which govern their action. There are also certain materials which have been analyzed and measured by investigators. The workers in these fields of research are the pure scientists, who are more concerned in discovery than in utilization. The business world can make but little practical use of this purely scientific knowledge without the aid of some one skilled in its application. This someone is the engineer. His work lies between that of the pure scientists and the commercial world. His training gives him an appreciation of the value of the discoveries of the one and an understanding of the needs of the other and he takes the abstract facts and theories disclosed by research and applies them to practical use. He is the "applied scientist," if we may use the term, whose special function consists in converting the great sources of power in nature to the use and convenience of man, and whose general function is to make these works pay. The principles involved are those which pertain to natural law, inert matter, latent force and economics, and they are applied in the scientific adaptation of materials, and in the direction of labor so as to accomplish a predetermined purpose with the least expenditure of money. E. H. McHenry, the well known railroad engineer, had in mind these essential elements of true engineering when he defined it simply as the "art of making a dollar pay the most interest."

It is evident that the man we are discussing is not the mechanic, artisan, or helper who only does the work laid out for him and appropriates the word engineer on account of the ingenuity which it implies, but that other worker, who is the intellectual force and spirit back of productions. In the broadest sense this man is the civil engineer. Having a comprehensive grasp of the true purpose of that which is to be achieved and the conditions which affect the method of securing results, this man directs the preparation of plans and specifications which indicate how and in what manner the desired purpose may be economically accomplished; directs the work of construction in order to insure compliance with the plans and specifications, effectively and expeditiously; manages the business operation so as to make it pay, and maintains the physical integrity of the whole. In fact, he is the man behind the works with a mind trained to grasp generally the practical things involved in accomplishments. He therefore goes back of stresses and dimensions to the money side of things and even back of the dollar to the public good in administration and policy. He is no longer only a technical man solving mathematical problems, but is also the practical business

man of commerce and industry who makes engineering a means rather than an end.

Now, the value of every engineer depends mainly upon his inherent qualities, his education, his experience and his executive ability; therefore, you young men who intend to become engineers have before you a man's work. There will be no boy's play or leisurely mediation, but the most serious and stiffest kind of a fight in which all the substance which finally forms your developed personality will be called into action. You should bear in mind that in your training you will be preparing yourselves so as to fully meet the specifications for a real engineer, which are briefly:

(1) He shall be ingenious, tactful, just and loyal—a man of sound judgment, quick to decide, prompt to act, and of inflexible integrity.

(2) He shall be educated. He must have a thorough knowledge of the scientific principles of engineering, of business methods and accounts, and he shall be able to speak and write with clearness, precision and brevity.

(3) He shall have experience in designing actual engineering works, in the responsible charge of their construction, in the organization of forces and management of business matters.

(4) He shall have executive ability. He must be capable of applying his knowledge and experience so as to produce the desired results expeditiously, effectively, and economically.

The first clause defines the inherent qualities, some of which you already possess, and the others may or may not develop. They are up to you. You have made a good start in your general education, but have still many technical studies before you, and let me impress upon you the fact that there are many graduates who have not got any education because they stopped learning on commencement day. Your experience will come in time provided you train yourselves to observe, but remember that some men pass through experience without ever acquiring it. They may see but do not observe. Executive ability, the final test of a real engineer, is the quality which will come to a greater or less extent with experience, and the extent which you finally possess it will determine whether you are to be controlling factors, engineer executives who marshal their forces and carry on the work, or mere working units among the forces.

I have called your attention to some of the prevailing erroneous opinions concerning the engineer and have endeavored to impress upon you the fact that there is a great difference between the *pseudo* and the *real* engineer. You should now have a proper conception of his function and his qualifications. If it is your intention to become

engineers then by all means prepare yourselves so that you will be classed among the *real engineers.* The present is the time to take an inventory of your inherent qualities and to build up the foundation of your education, and in doing so bear in mind that a flaw in the foundation will always be a menace to the stability of the completed structure. Experience and executive ability are matters of the future. Your opportunities or your necessities will eventually indicate the fields of your labors, therefore be prepared to enter any of these fields. Your preparation will be solely up to you, and your future success as engineers will depend largely upon the strength of the foundation which is now in the course of construction.

SOME RECENT EXAMINATION PAPERS.

MECHANICS.

FOURTH YEAR CLASS—January 22, 1913.

1. A stone is projected vertically upward with a velocity of 240 feet per second. How many feet will it pass over during the fourth second of its upward flight? At what altitude will it be at the end of the sixth second, and also at the end of the seventh?

2. Two ships leave a port at the same time, the first steams northwest at 12 miles per hour, and the second 30° south of west at 15 miles per hour. What is the speed of the second relative to the first? After what time will they be 100 miles apart, and in what direction will the second lie from the first?

3. A bullet weighing 1 oz. enters a block of wood with a velocity of 2,000 feet per second, and penetrates it to a depth of 6 inches. What is the average resistance of the wood to the bullet?

4. A locomotive draws a train weighing 200 tons along a level track at 30 miles per hour, the resistance amounting to 30 lbs. per ton. What horse-power is it exerting? Find also the horse-power necessary to draw the train at the same speed: (a) up an incline of 1 in 100, (b) down an incline of 1 in 100.

5. A cannon weighing 50 tons projects a shot weighing 2000 lbs. with a velocity of 1,500 ft. per second. With what initial velocity will the cannon recoil? What average force will be required to bring it to rest in 2½ feet?

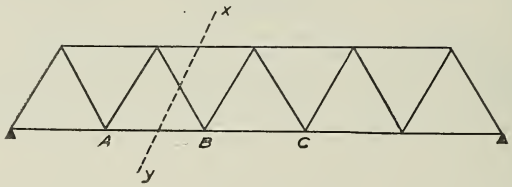
6. How long will it take a car weighing 10 tons to accelerate from 10 miles per hour to 15 miles per hour against a resistance of 25 lbs. per ton, if the motors exert a uniform tractive force on the wheels and the horse-power is 25 at the beginning of this period?

7. A wheel has five equally spaced spokes, all in tension. If the tension of three consecutive spokes are 1,000 lbs, 1,500 lbs. and 2,000 lbs., respectively find the tensions in the other two.

8. With a coefficient of friction of 0.15, what must be the inclination of a plane to the horizontal if the work done by the minimum force in dragging 50 lbs. a vertical distance of 5 feet up the plane is 400 foot lbs.?

9. Four forces of 6, 9, 4 and 5 lbs. act along the respective directions AB, BC, DC and AD of a square ABCD. Two other forces act one in CA and the other through D. Find their amounts if the six forces keep the body in equilibrium.

10. The jointed structure given below is built up of bars all of equal length, and carries loads of 10, 12 and 18 tons at AB, and C, respectively. Find by the method of sections the stress in each of the members cut by the section x.y.



MECHANICS OF MATERIALS.

FOURTH YEAR CLASS—May 21, 1913.

1. Find the moment of inertia and radius of gyration of a trapezoid about an axis coinciding with the larger base.

2. A beam 28 feet long weighing 1,000 lbs. per foot overhangs the left support 5ft. and the right support 3 ft. It bears concentrated loads of 1,000 lbs. and 4,000 lbs. at points 10 ft. and 21 ft. respectively from the left support. Construct the bending moment diagram. Linear scale, 1″=8′; bending moment scale, 1″=1,000 lbs. ft.

3. Construct the shear diagram for the beam of problem 2. Load scale, 1″=3,000 lbs.

4. It is desired to place an I beam across an opening of 18 feet in a building. The beam is to sustain a concentrated load of 400 lbs. at a point 7 ft. from the left end and a uniformly distributed load including the weight of the beam of 200 lbs. per foot. Select a Cambria I beam for this case.

5. A continuous beam resting on three supports equally spaced and on the same level is uniformly loaded.

Find: (a) The support reactions.

(b) An expression for the deflection at any section.

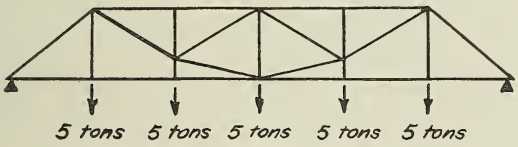
6. A hollow cylindrical cast iron column with square ends is 18 ft. long and has an outside diameter of 15 inches. Determine the inside diameter in order that it may safely bear a load of 300,000 lbs.

7. Find the width and thickness of the belt necessary to transmit 15 H. P. to a pulley 18″ in diameter so that the greatest tension may not exceed 50 lbs. per inch of width when the pulley makes 400 r. p. m. The weight of the belt per square foot is 1.44 lbs. The coefficient of friction is 0.28, and the arc of contact is 165°. The weight of 1 cu. in. of leather may be taken as 0.036 lb.

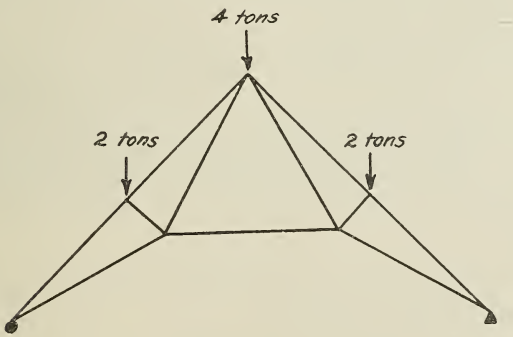
(GRAPHIC STATICS.)

8. A beam 28 ft. long weighing 100 lbs. per foot overhangs the left support 5 ft. and the right support 3 ft. It bears concentrated loads of 1,000 lbs. and 4,000 lbs. at points 10 ft. and 21 ft., respectively, from the left support. Construct the funicular polygon. What is the maximum bending moment? Locate the points of inflection if there are any. Linear scale, 1″=8′; load scale, 1″=2,000 lbs.; polar distance, 0.75″.

9. Determine the stress in each number of the Greiner Truss. Load scale, 1″=5 tons.



10. The roof truss shown below has a span of 50 ft., the left end of the truss is free and the right end fixed. Normal wind pressure, 33 lbs. per sq. ft. of roof surface; distance between trusses, 14 ft. Consider the wind blowing on the left side of roof. Find the stress in each number of the truss. Linear scale, 1″=10 ft.; load scale, 1″=4 tons.



STEAM ENGINEERING.

THIRD YEAR CLASS—June 6, 1913.

1. A vessel of 75 cu. ft. capacity contains air at a pressure of 150 lbs. per sq. in. Find the weight of the air in the vessel.

2. The following results were obtained from an efficiency test of an engine and boiler:

I. H. P. of engine	120
B. H. P. of engine	100
Steam used per hour	2,200 lbs.
Gauge pressure of steam	99.3 lbs.
Temperature of steam	337.4° F.
Superheat of steam	50° F.
Coal used per hour	240 lbs.

Total heat lost in chimney gases per lb. of coal—3,000 B. T. U.

The coal used contained 90%C., 2%H., 7%O., and 0.8%S. 20 lbs of air were used in burning one lb. of coal. The temperature of the air supply was 57° F., and of the chimney gases, 620° F. The specific heat of N is 0.244; of O, 0.218; of CO_2, 0.217; or H_2O, 0.42, and of SO_2, 0.17.

Find temperature of furnace.

3. From the data of problem 2 find:
   a. Mechanical efficiency of engine.
   b. Thermal efficiency of engine.
   c. Thermal efficiency of engine and boiler.
   d. Boiler horse-power.

4. From the data of problem 2 find:
   a. Efficiency of combustion.
   b. Efficiency of heating surface.
   c. Efficiency of boiler.
   d. Efficiency of system.

5. A triple expansion engine, having cylinders of 12″, 17″ and 22″ diameter, and 10″ stroke, has 0.5 cut-off in the high pressure cylinder and 6.5% clearance in each cylinder. Find the ratio of expansion. If the initial presure is 200 lbs. per sq. in., find the terminal pressure.

6. During a boiler test in the Mechanical Laboratory of the Baltimore Polytechnic Institute the following was obtained with a barrel calorimeter:

160 lbs. of water at 65° F. in barrel before test.

10 lbs. of steam at 358° F. were blown into water in barrel.

120° F. temperature of mixture.

Find the dryness fraction of the steam.

STEAM ENGINEERING.

FOURTH YEAR CLASS—June 11, 1913.

1. A boiler evaporates 9 pounds of water per pound of coal into steam of 185 pounds pressure per gauge from a feed water temperature of 152 degrees, the steam containing 3% of moisture. The coal contains 12% of ash and 4% of moisture. Find the actual evaporation and equivalent evaporation from and at 212 degrees per pound of dry combustible.

2. Required the cylinder dimensions of a compound engine to develop 2,200 I. H. P. while working under the following conditions: Piston speed, 750 feet per min.; initial absolute pressure, 112 pounds per square inch; absolute back pressure, 2 pounds; cut-off in high-pressure cylinder, 0.4 of stroke; clearance in high-pressure cylinder, 12 per cent.; clearance in low pressure cylinder, 10 per cent. Assume a cylinder ratio of 3.25 and a mean pressure factor of 0.8.

3. Stroke, 8 inches; steam lap, 5/8 inch; maximum port opening to steam, 9/16 inch; exhaust lap, 1/8 inch; release, 90 per cent. of stroke; connecting rod length, 15 inches. Find by means of the Zeuner diagram: Travel of valve; angular advance; lead and cut off in per cent. of stroke.

4. Stroke, 15 inches; clearance, 6 2/3 per cent. of stroke; cut-off, 0.2 stroke; pressure at cut-off, 76 pounds absolute. Plot the curves for hyperbolic and saturated steam expansion finding points on the curve when R equals 2, 3 and 4. Linear scale, 3″=1′; pressure scale, 1″=40 lbs.

5. Stroke of engine, 24 inches; clearance, 6 per cent. of stroke; cut-off, 3/8 of stroke; ratio of compression, 3; initial absolute pressure, 85 pounds; absolute back pressure, 18 pounds. Using the properties of the indicator diagram of preliminary engine design, find the mean effective pressure.

6. Using the data of problem number 5, determine the indicated steam consumption per indicated horse-power per hour.

STEAM AND GAS ENGINEERING.

FOURTH YEAR CLASS—May 16, 1913.

1. A Scotch boiler is to be designed to withstand a steam pressure of 250 lbs. per square inch and to have a diameter of 15′. The flat top of the combustion chamber is to have an area of 32″x48″ and is to be braced with girder stays 7/8″ in thickness. The stay bolts are to be pitched at 6″, the tensile strength of the steel used is to be 65,000 lbs. per square inch, and its factor of safety, 4.

Find (a) The depth of the girder stays; (b) diameter of the stay bolts; (c) thickness of the boiler shell.

2.

The above indicator card was taken from an engine having a clearance space of 5% of the stroke volume. Taking a point on the expansion curve at 65 lbs. absolute pressure and one on the compression curve at 22 lbs. absolute pressure, compute the indicated steam consumption per I. H. P. per hour.

Sketch the cylinder, piston and arrangement of the pumps of the Koerting, two cycle, double acting, gas engine. Supplement your sketch with an explanation of their functions during one cycle.

Sketch a reversing gear for a marine gas engine. Describe its operation.

Draw indicator cards which illustrate the following: Throttling the normal charge; retarding the ignition; too early ignition; faulty exhaust.

State the cause of and remedy for the following faults: Knocking, crank chamber explosions, smoky exhaust, loss of compression, premature ignition.

Sketch a Schebler carbureter. Describe its operation.

MECHANICAL LABORATORY PRACTICE.

FOURTH YEAR CLASS—May 29, 1913.

1. Describe the process of making wrought iron. What is the effect of sulphur and of phosphorous on wrought iron? Give the uses of wrought iron in engineering.

2. Describe Nickel Steel. Describe Tungsten Steel. What materials and what proportions of each are used in making semi-steel?

3. Define stress and strain. Describe the method of conducting a tension test on a specimen of wrought iron.

4. Derive a formula for use with the throttling calorimeter. Boiler pressure per gauge, 152.5 lbs.—barometer pressure, 20.62 inches of mercury; pressure in the calorimeter, 3 lbs. per gauge; temperature of steam in calorimeter by thermometer, 300 degrees F. Find the dryness fraction.

5. Sketch the Mahler Bomb Calorimeter and describe its action.

6. In a test made with a Junker Gas Calorimeter, the following data were obtained:

Inlet temperature, 66.5° F.; outlet temperature, 104.03° F.; temperature of gas, 85° F.; barometer, 29.8 inches of mercury; pressure of gas in pressure regulator, 0.0132 inches of mercury, and its vapor tension at 85° temperature is 1.209 inches of mercury. During the test 4.68 lbs. of water were heated by the use of 0.3 cu. ft. of gas, and 0.011 lbs. of water of combustion was trapped at a temperature of 50° F. Find: (a) Upper heating value, (b) lower heating value, (c) normal heating value.

DIFFERENTIAL CALCULUS.

FOURTH YEAR CLASS—JUNE, 1909.

1. Define increment and derivative. Illustrate by finding the derivative of the function $y = \sqrt{a^2 - x^2}$.

2. Find $\frac{dy}{dx}$ when $x = a \log \frac{y + \sqrt{y+a}}{\sqrt{a}}$

3. What is the area of an equilateral triangle at the moment its side is increasing at the rate of 10 feet per minute and its area at the rate of 10 square feet per second?

4. Find $\frac{dy}{dx}$ from $y = (x^2+1)\sqrt{x^3-x}$.

5. Find $\frac{dy}{d\theta}$ from $y = \log \frac{\sin \frac{1}{2}(\theta - a)}{\sin \frac{1}{2}(\theta + a)}$

6. Find $\frac{d^3y}{dx^3}$ from $y = (\sin x - \cos x)\ xe^x + 3e^x \cos x$.

7. Determine the limiting value of $\frac{\log (x^2 - 4x + 5)}{\log \cos (x-2)}$ when $x = 2$.

8. Find the tangent of 44°, using Taylor's Theorem.

9. A weight of 1,000 pounds hanging two feet from the fulcrum end of a lever is to be raised by an upward force at the other end. Supposing the lever to weigh 10 pounds per foot, find its length that the force may be a minimum.

10. Find the equations of the two tangents to the circle $x^2+y^2-3y=14$, parallel to the line $7y=4x+6$.

11. Change the independent variable from x to z in the following: $\frac{d^2y}{dx^2} + \frac{1}{x}\cdot\frac{dy}{dx} + y = 0$, when $x^2 = 4z$.

Omit any one except 4 or 9.

INTEGRAL CALCULUS.

FOURTH YEAR CLASS—JUNE, 1913.

1. Show that the area of the triangle intercepted between a tangent to the curve $2xy = a^2$ and the axes is constant and equal to $2a$.

2. Show that the curves $y^2 = ax$ and $2x^2 + y^2 = b^2$ meet at right angles.

3. Given $u = \frac{y}{z} + \frac{z}{x} + \frac{x}{y}$. Prove that x multiplied by the partial derivative of u with regard to x, plus y multiplied by the partial derivative of u with regard to y, plus z multiplied by the partial derivative of u with regard to z is equal to zero.

4. Find the asymptotes of the curve $(x-2a)\ y^2=x^3-a^3$.

5. Find the volume generated by revolving $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ about the axis OY.

6. $\int \frac{x^4dx}{x^2-3x+2}=?$

7. $\int \frac{\log x dx}{\sqrt{3x-2}}=?$

8. $\int \sin^2 x\cos^2 x dx=?$

9. $\int x^3\log x dx=?$

10. Find the area of one arch of the curve $y=\sin\frac{1}{2}x$.

TRIGONOMETRY.

SECOND YEAR CLASS—JUNE 4, 1913.

1. On the circumference of a circle of 50 feet radius an arc of 10 feet is laid off. How many degrees in the angle at the centre subtended by this arc?

2. Prove that $\frac{\sin A}{\cos A}+\frac{\cos A}{\sin A}=\sec A\csc A$.

3. Given $\sec A=2$. Find the numerical values of the other functions of the angle A.

4. Solve $\tan^2 x+\csc^2 x=3$.

5. Find the numerical values of all the functions of 60°.

6. In a right triangle, given $b=12$, $A=29°\ 8'$. Find a, c, B and the area.

7. A fort stands on a horizontal plane. The angle of elevation of the top of the fort from a certain point on the plane is 30°, and from a point 100 feet nearer the fort it is 45°. How high is the fort?

ANALYTIC GEOMETRY.

THIRD YEAR CLASS — June, 1909.

1. Find the equation of the ellipse, having given the foci and the constant sum 2a.

2. The equation of an ellipse is $25x^2 + 81y^2 = 450x$ when referred to rectangular axes. Find the major and minor axes and the co-ordinates of the centre.

3. Tangents are drawn from (3, 2) to the ellipse $x^2 + 4y^2 = 4$. Find the equation of the chord of contact, and of the line that joins (3, 2) to the mid-point of the chord.

4. Find the equations of the tangent and the normal to the hyperbola at the point (x_1, y_1) on the curve.

5. Write the equation of the hyperhola conjugate to $9x^2 - 16y^2 = 144$, and find its axes, distance between its foci, and its latus rectum.

6. Find the length of the semi-diameter conjugate to the diameter $y = 3x$ in the hyperbola $9x^2 - 4y^2 = 36$.

7. Define the Conchoid of Nicomedes. Develop its equation and discuss it.

8. Plot the curve whose equation is $r = a(1 - \cos\theta)$.

SURVEYING.

THIRD YEAR CLASS — June 12, 1908.

1. Show, by a drawing, a vernier reading 7.563.

2. From the following field notes, plot the field and calculate its area:

1. N. 73° 30′ W. 5.00 chains.
2. S. 16° 30′ W. 5.00 chains.
3. N. 28° 30′ W. 7.07 chains.
4. N. 20° 00′ E. 11.18 chains.
5. S. 43° 30′ E. 5.00 chains.
6. S. 13° 30′ E. 10.00 chains.

3. In the triangle ABC, AB = 12 chains, AC = 10 chains, and BC = 8 chains; part off a trapezoid of 1 acre 96 perches by the line DE parallel to AB.

4. Write the proper numbers in the third and fifth columns in this scheme, make a profile of the section, and determine the gradient per station:

Station	+ S	H. I.	—S	H. S.	Remarks.
	6.944				Bench on post
0			7.4		22 feet north
1			3.9		of 0.
2			5.6		
3			4.6		
t. p.	3.855		5.513		
4			4.9		
5			3.5		
6			1.2		

ALGEBRA.

SECOND YEAR CLASS—May 31, 1910.

1. The second of three numbers is a mean proportional between the other two. The third number exceeds the sum of the other two by 20, and the sum of the first and third exceeds three times the second by 4. Find the numbers.

2. The distance fallen by a body from rest varies as the square of the time during which it falls. If it falls 579 feet in 6 seconds, how long will it take to fall 402 1/12 feet?

3. Find four numbers in geometric progression such that the sum of the first and fourth shall be 27, and the sum of the second and third shall be 18.

4. Write the fourth term of $(m^4 - 5mn)^{16}$.

5. Separate into partial fractions $\dfrac{10 - 9x}{5x^2 - 14x + 8}$.

6. Find the value, using logarithms, of $\dfrac{27.931}{\sqrt{0.836} \times (0.03023)^{\frac{1}{7}}}$.

7. Solve $0.89732^x = 85.152$.

8. Insert 5 arithmetic means between $\frac{5}{9}$ and $\frac{1}{3}$.

GEOMETRY.

SECOND YEAR CLASS — June, 1909.

1. Prove that the volume of a triangular pyramid is equal to one-third of the product of its base by its altitude.

2. Prove that the volumes of two triangular pyramids, having a trihedral angle of the one equal to a trihedral angle of the other, are to each other as the products of the three edges of these trihedral angles.

3. Prove that every section of a circular cone made by a plane parallel to the base is a circle.

4. Find the diameter of a given material sphere.

5. Find the radius of a circle determined by a plane one inch from the centre of a sphere 5 inches in diameter.

ELECTRICITY.

FOURTH YEAR CLASS — May 26, 1913.

1. A three-phase generator is rated at 5000 kilovolt-amperes at 13,200 volts. What is the maximum current it may deliver not to exceed its rating? For what primary voltage should transformers be designed if intended to be star connected on this line?

2. A transformer test gives the following data: Core loss, at rated primary voltage, 325 watts; copper loss, 48 amperes flowing in the secondary, 200 watts. What will be the efficiency when delivering 60 amperes at 110 volts? What will be the output in kilowatts when the efficiency is a maximum. Make diagrams for the tests for core loss and for copper loss.

3. A rotary converter has an output of 800 amperes at 600 volts, direct current side. What will be the voltage of the alternating current supply? What will be the amperes intake if the efficiency of the rotary is 92 per cent., not considering the field loss? What per cent. slip occurs in a four-pole induction motor if the speed is 1,725 revolutions per minute on a 60 cycle current?

4. For what kind of service is the mercury arc rectifier used? What is the fundamental principle upon which its action depends? What part is performed by the reactance.

5. Show by diagram the necessity for a reverse current relay. Show by a second diagram the coils of the relay and the instrument transformers connected to the line. Show by diagram the connections to a compensated voltmeter.

6. A single-phase generator has a total of 576 conductors in a three-section winding. The revolving field makes 94 revolutions per minute and has 32 poles, each pole having a flux of 30,000,000 maxwells. What electromotive force will be produced? (Constant for three section winding is 0.707). If the efficiency of this machine were 94 per cent., and the power factor of the load 90 per cent., what horsepower would be required to drive the generator when delivering 150 amperes?

CHEMISTRY.

FOURTH YEAR CLASS—May 28, 1913

1. How is the end reaction indicated in making a determination for ammonia? What is the color of the precipitate formed when a solution of $Na_2S_2O_3$ is titrated into a solution of Hg $(NO_3)_2$? Show how the constant 0.42 is calculated in a determination for H_2SO_4. How may all the iron in a solution be converted into ferrous iron before making a determination for per cent. of iron? In a gravimetric determination for phosphorus, why should not the solution be heated above 40°C. after adding ammonium molybdate?

2. How are normal solutions prepared? What weight of NaCl per liter must be used to prepare a solution that will precipitate 0.015 g. of silver per cubic centimeter? Calculate the number of cc. of H_2SO_4 required for a normal solution, the acid used being 95% pure and its specific gravity 1.8.

3. How many grams of 10% (by weight) solution of barium chloride are needed to precipitate, as barium sulphate, the SO_4 in 2 g. of magnesium sulphate? (Mg=24.) How many grams of $KMnO_4$ per liter must be used for a standard solution to convert iron at the rate of 0.015 g. per cc. of solution, if the substance combines in the ratio of $2KMnO_4$ to 10 Fe when the iron is reduced?

4. Prepare a table giving the weights of a cubic foot and of a cubic meter and the volume of a pound and of a kilogram of each of the following: CO, CO_2, CH_4, C_2H_4, C_2H_6, N_2, O_2, and Cl_2.

5. In testing a sample of iron for per cent. of carbon, the potash bulb is found to have increased in weight 2.2 g. If the sample weighed 10 g., what was the per cent. of carbon in the iron?

Anthracite coal contains the following: C, 86%; H, 2.5%; O, 3%; N, 0.5%; S, 0.5%; H_2O, 1.5%, and ash, 6%. Calculate the volume of air necessary for the complete combustion of a kilogram of the coal and the volume of the products of combustion. Temperature, 25°C., and pressure, 70cm.

6. 100 cc. of a mixture of CH_4, H_2S, H_2, and N_2 are passed into a weighed quantity of KOH solution and the potash increases in weight 0.0153 g. The residue is mixed with air and exploded and the volume is found to have decreased to 30 cc. These 30 cc. are passed into KOH and a further reduction of 20 cc. takes place. Calculate the percentages of the gases in the mixture.

7. One metric ton of an ore containing 44% of $Cu_2SFe_2S_3$ is roasted in air and reduced by carbon. Temperature 20°C. and pressure 70 cm. and assuming the cuprous and ferrous oxides are formed, calculate the volume of dry air necessary; the weights of copper and iron that can be obtained; and the volumes of carbon dioxide and sulphur dioxide that will be liberated.

8. How is sodium prepared commercially? What are its physical properties (color, hardness, conductor of heat and of electricity)? What are its chemical properties (action with water, acids)? In what respects does potassium resemble sodium?

9. What causes hardness in water? How may it be remedied? Give three uses of calcium hydroxide. How may zinc be obtained from its sulphide? How may gold be separated from silver? Silver from lead?

10. What is bleaching powder; lime; mortar; plaster; cement; porcelain; glass; white lead; red lead; and plaster of Paris?

ENGLISH.

FIRST YEAR CLASS—June, 1913.

1. Mention the cases of concealed identity in "The Lady of the Lake," and tell the purpose of each concealment.

2. Why is the ballad "Alice Brand" introduced into the poem?

3. Show how Scott varies the verse to suit the thought he portrays.

4. Discuss the plot of "Ivanhoe" and give the main incidents of the plot.

5. Point out the most important events in the trial of Rebecca.

6. Compare Wilfred of "Ivanhoe" with James Fitz-James.

7. Name four characters in "Virginia," and state the connection of each with the story.

8. Define redundancy and illustrate your answer by use of a sentence.

9. Illustrate the difference between specific and general terms.

10. Place two inverted sentences in "balanced construction."

FIRST YEAR CLASS—June, 1913.

1. What effect is intensified by having Rip's return take place just at the election?

2. Why was "Sleepy Hollow" admirably suited to the story which Irving tells of Ichabod Crane?

3. "Whittier's poems show a masculine vigor combined with a womanly tenderness." Explain.

4. Tell in one paragraph the story to be found in "Snow-Bound."

5. From "The Ambitious Guest" show that Hawthorne was a skillful maker of plot.

6. What is the difference in the method of character drawing between that used in "The Great Stone Face" and that employed in "The Ambitious Guest"?

7. What uses are served by the prelude in "The Vision of Sir Launfal"?

8. "Lowell is like a preacher in 'Sir Launfal' ". Prove this assertion.

9. What use does Poe make of setting, suspense, analysis and mystery in his stories?

10. Name some of the devices that Poe uses in his poetry.

11. How is narrative best outlined?

12. Why are violations of unity in sentences violations of clearness?

THIRD YEAR CLASS—June, 1913.

1. Write one or more paragraphs on each of the following topics:

(1) The Use of the Graph in Literature. (2) The Play and the Novel. (3) The Moving Picture Play and the Stage. (4) "Shakespeare is for all time." (5) "Milton is Difficult Reading."

2. Describe to an intelligent adult who has no technical knowledge the action of the common street-car motor.

3. "Resolved, That baseball is preferable to football." Make brief.

4. Outline the periods in the history of English literature, mentioning the principal characteristics and writers of each period.

THIRD YEAR CLASS—June, 1913.

1. Comment on the *twin-poem* aspect of "L'Allegro" and "Il Penseroso."

2. Write whatever explanation of "Lycidas" you consider necessary for an intelligent person in order that he may read the poem with understanding.

3. Explain (a) the nature of the "mask," and (b) wherein it differs from the regular drama.

4. In what way do you think the moving-picture theater may affect the legitimate theater?

5. Explain briefly the various kinds of arguments, illustrating, if possible, each kind by an example in the "Conciliation."

6. Comment on some of the marked peculiarities of Burke's style.

7. Draw up a brief upon the affirmative of the following proposition, and write out the refutation: Resolved, That entertaining conventions is advantageous to a city.

TECHNICAL ENGLISH.

FOURTH YEAR CLASS—January, 1914.

1. Describe the Polytechnic site, buildings, equipment, and plant for the magazine section of the Sunday Sun or the American, using not more than three sketches.

2. (a) Write the Imp Cycle-Car Company, Rahway, N. J., applying for the position of city salesman. State carefully every reason why you believe you would be successful in selling Imp cycle-cars.

(b) Write a reply from J. H. Marsh, sales manager of the Imp Company, asking whether you would be willing to go to Oklahoma on a salary of seventy-five dollars ($75.00) a month and a 5% commission on sales.

(c) Write a telegram not exceeding ten words in length declining the offer, but expressing willingness to go on a 10% commission, your transportation out to be furnished by the company.

3. Explain to an intelligent layman, who knows nothing of the action of internal-combustion engines, exactly how a gas (or gasoline) engine works.

4. Mark diacritically the following words:

Gauge.	Judgment.	Apparatus.
Data.	Turbine.	Eccentric.
Stoichiometry.	Calipers.	Vacuum.
Chlorine.	Philippines.	Fascinate

GERMAN.

FIRST YEAR CLASS—June, 1913.

A. Ein Bauer will eine Ziege, einen Wolf und einen Haufen Kohl in einem Kahne (Schiff, Boote) über einen Fluß bringen. Der Kahn ist aber so klein, daß der Bauer nur einen von den Gegenständen darin nehmen kann. Was soll der Bauer jetzt tun? Wenn er den Wolf zuerst übersetzt, so frißt die Ziege den Kohl auf. Er muß also die Ziege zuerst mitnehmen. Aber was wird er das zweite Mal überbringen? Nimmt er dann die Ziege mit, so wird der Wolf während der zweiten Rückfahrt die Ziege zerreißen. Wenn er den Kohl zur zweiten Ueberfahrt mitnimmt, so werden die Ziege und der Kohl wieder beisammen sein. Ein sehr kleiner Jüngling, der diesem Selbstgespräch schweigend zugehört hat, rät dem Bauer, daß er den Kohl zuerst nehmen sollt. Der Bauer sieht ihn verächtlich an und antwortet: „Sobald ich das tue, wird der Wolf bei der Ziege bleiben."

Während er verzweifelt da steht, kommt ein alter Mann, der einen Spaziergang macht. Dieser weiß wie man es verrichten kann. Er sagt dem Bauer, daß er die Ziege an einen Baum anbinden solle. Aber der Bauer antwortet: „Wo werde ich einen Strick bekommen?"

Der alte Mann denkt eine Weile nach. Dann gibt er das folgende Mittel an: „Nehmen Sie die Ziege bei der ersten Ueberfahrt mit; der Wolf, der keinen Kohl frißt, wird dann beim Kohle bleiben. Das zweite Mal nehmen Sie den Kohl, aber bei der Rückfahrt werden Sie die Ziege zurücknehmen müssen, und sie an das Ufer setzen wo der Wolf wartet. Dann werden Sie den Wolf hinüberbringen müssen. Und zuletzt werden Sie die Ziege wieder holen."

Der Bauer dankt dem alten Manne und folgt seinem Rate.

B. 1. Give the principal parts of 12 of the following verbs: will, kann, soll, tun, frißt auf, muß, überbringen, zugehört hat, sieht an, steht, weiß, denkt nach, gibt an, bekommen, mitnehmen.

2. a. What is the Inverted word-order? When do we use it? Illustrate from Section A.

b. What is the Transposed word-order? When do we use it? Illustrate from Section A.

3. Name the case of four of the following, giving reason for using it:

a) einen Fluß (ll. 1 & 2.)
b) den Gegenſtänden (l. 2.)
c) das zweite Mal (l. 4.)
d) zur zweiten Ueberfahrt (l. 5.)
e) eine Weile. (l. 12.)

4. Answer one of the following parts:

a) Explain why in l. 4, „mit" comes at the end of the clause after the verb „nimmt" with which it is compounded, and in l. 5, comes before „nimmt."

b) Conjugate Pres. of können und wollen.

c) Account for the position of „an," (l. 9.)

5. Answer either a and b, or c.

a) Name part of speech and decline: ihn (l. 7.)
b) Name part of speech and decline: der (l. 13.)

or

c) Explain the use of darin (l. 2), stating for what it stands.

C. 1. Two youths were taking a walk one day and saw a large cabbage-head in a garden.

2. Fritz, who was a teacher, had never seen so large a head of cabbage.

3. But Charles said: "I once made two large kettles (Keſſel, m.) which were larger than that large head of cabbage.

GERMAN.

FOURTH YEAR CLASS—June, 1913.

1. Translate: Immensee, p. 36 (Dauer's edition).

2. (a) Write out in full, in German (from the Immensee selection above), one example of each of the word orders, explaining why each is used where it stands.

(b) Why is *hinabzog* (l. 6, p. 36) not separated, whereas "*spazierte —umher*" (lines 7 and 8) is separated?

(c) State the voice, mode and tense of *ist gebaut worden* (ll. 17 and 18, p. 36). Explain the construction *erfuellt* war (l. 9, p. 36).

3. Translate: Germelshausen, pp. 39 and 40 (Lovelace's edition).

(a) Give the principal parts of five weak and of five strong verbs from the selection (Germelshausen).

(b) Give case, with reason therefor, of the following nouns: Seiner Sinne (l. 2), seine Mappe (l. 10), Kirchhof (l. 11), den Hang (l. 12), den Weg (l. 24).

AMERICAN HISTORY AND CIVICS.

SECOND YEAR CLASS—May, 1913.

A. Answer Two Parts.

1. Give an account of two important judicial decisions handed down by the Supreme Court of the U. S. State the principles involved and the effect of the decisions on the later history of the country.

2. Give an account of the various ways in which slavery was abolished in the U. S. between 1861 and 1865. Be explicit.

3. When and under what circumstances were the following pieces of territory acquired by the U. S.: (a) Texas, (b) Alaska, (c) Louisiana; (d) Florida; (e) Panama Canal Zone.

B. Answer Two Parts.

4. Give the provisions of the 14th amendment. For what purposes was this amendment intended principally? Have these purposes been accomplished? Explain.

5. (a) Give three examples that would seem to show, from an historical standpoint, that Congress had power to regulate slavery in the territories prior to 1850. (b) Do you think slavery or secession was the cause of the Civil War? Give reasons.

6. Explain five agencies which aided in the settlement and the development of the Middle West.

C. Answer Two Parts.

7. (a) Give an account of economic conditions in the North and the South before the Civil War. (b) What methods were adopted by each side to obtain money to carry on the war?

8. Describe the impeachment proceedings against Andrew Johnson and the events that led up to it.

9. With what events or movements were the following people connected: (a) Horace Mann; (b) Dorothea Dix; (c) Stephen A. Douglas; (d) Samuel Tilden; (e) John Brown? Explain at some length.

D. Answer Two Parts.

10. How do political parties originate? Show from history how any three parties have arisen giving (a) the time of their appearance, (b) their principles, (c) their most noted leaders.

11. Explain how a bill may become a law in Maryland. (Three ways).

12. (a) Explain the initiative and referendum. (b) Give an account of the recall of elected officials as carried out in Oregon.

E. Answer Two Parts.

13. From what sources does the U. S. Government receive its revenue? Explain. (b) What recent amendment to the Constitution has made possible a new source of revenue for the government? Why was this amendment necessary?

14. Give an account of the commission form of city government. Compare the commission form with that in use in Baltimore. Do you think the commission form could be carried out successfully in this city? Give reasons.

SPECIMEN ENTRANCE EXAMINATION PAPERS.

Set for Pupils Other Than Those Promoted From the Grammar Schools.

SPELLING AND PENMANSHIP.

Writing from dictation a paragraph or two of some standard test—Irving's Rip Van Winkle or Bancroft's United States History.

GRAMMAR.

I. Use each part of speech in a different sentence, indicating the part of speech used in each sentence by underscoring and naming it.

II. Define and give an example of a simple sentence, of a complex sentence, and of a compound sentence.

III. Parse the italicized words in the following sentence: "By not heeding the *counsels* of our elders, *how* often do we *lose what* we should gain!"

IV. Analyze the following sentence: "If we send the sailors a message in time, they will help up when the savages attack us."

V. Write sentences illustrating the correct use of any perfect tense of each of the following verbs: sit, set, seat, lie, lay, write, go.

COMPOSITION.

The subject set is a description of some well-known place or object, or an account of some historical event.

UNITED STATES HISTORY.

1. What country was each of the following explorers serving when he came to America, and what territory did he discover or explore: Columbus, De Soto, Drake, Cartier?

2. Locate the settlements of the French, the Spanish, the Dutch.

3. Give a brief account of the settlement of Maryland.

4. Give a brief account of the wars between the English and French, extending from 1689 to 1763. State causes and results.

5. (a) State several causes of the Revolutionary War. (b) Name four important battles of the Revolution, and give a brief account of each.

6. What were the "Articles of Confederation," and why, and by what, were they superseded?

7. What is meant by "The Missouri Compromise?"

8. Name the principal causes of the Civil War. Who commanded on each side at Gettysburg? Why was the battle of Gettysburg so important?

9. What reason did the United States assign for going to war with Spain in 1898? What territory did the United States acquire as a result of that war?

ARITHMETIC.

1. Divide 5.375 by 0.0125, obtaining the exact result.

2. Simplify $\dfrac{1+0.5}{1-0.5} \times \dfrac{0.05 \div 0.005}{0.005 \div 0.05} - \dfrac{0.4\frac{1}{2}}{0.22\,2/9.}$

3. A merchant's sales on Monday amounted to $385.84. His sales on Monday were 16 2/3% of 54% less than the amount of goods sold on Tuesday. What was the amount of Tuesday's sales?

4. A firm sold an engine for $7,050, thereby losing 6%; for what should it have been sold in order to gain 12%?

ALGEBRA.

1. Factor the expressions: $a^2 + 6ax + 5x^2$, $n^{10} - 16n^5 - 80$, and $1 - 9x - 36x^2$.

2. Simplify $(a^2 - x^2) \div \left(\dfrac{1}{x} - \dfrac{1}{a}\right) \Big] - \Big[(a^2 - x^2) \div \left(\dfrac{1}{x} + \dfrac{1}{a}\right) \Big]$

3. Given $\dfrac{2x+1}{5} - \dfrac{3y+2}{7} = 2y - x$, $\dfrac{3x-1}{4} + \dfrac{7y+2}{6} = 2x - y$, find the values of x and y.

CATALOGUE OF STUDENTS.

Students whose names are marked with an asterisk (*) received 85% or more of the possible multiple for the year.

MID-YEAR CLASS OF 1914—26 MEMBERS.

Alcarese, Alphonso
Armstrong, M. Albert
Benfer, Wilbur E.
Cesky, Frank A.
Clayton, Edwin C.
Day, Hugh Walter
Emich, H. Crawford
Fusselbaugh, Reardon
Hall, Spencer
Heimiller, Maurice M.
Hiss, Charles A.
Klitch, Alexander
McLaughlin, Harvey F.
Matusevitz, Edward
Mueller, Edgar A.
Preston, J. Owings
*Reitz, Robert A.
Rodgers, Henry P.
Rudis, V. Vyant
Schloss, Benjamin
Spies, Arthur T.
Tretick, Isaac
Waller, James M. S.
Weissing, Louis
Woodall, James H.
Yearley, Edwin C.

CLASS OF 1914—86 MEMBERS.

Awalt, F. Gloyd
*Bangs, John R., Jr.
*Bishop, Gordon K.
*Black, C. Warren
*Bloomsburg, Ralph A.
*Bristor, Charles E., Jr.
Burns, Charles W.
Bursnall, William G.
Childs, Walton B.
Constam, Milton M.
Coursey, George C.
Crist, Frank
Cromwell, Stanley S.
*Cullom, Kenneth S.
Dempster, Ryland
Derr, Brant S.
Disney, Leroy R.
Ditman, Rothwell
Edel, Walter L.
Elliott, David, Jr.
*Ewell, Frank O.
Fleischman, Leonard
*Fox, Charles
Freeman, Stanley P.
Greenberg, Harry
Hardinge, Thomas H.
Harman, George D.
Hennick, Donald C.
Hicks, E. Russell
Hoffman, Charles E.

Hoffman, H. Lee
Hogan, Harold O.
Hoke, William B.
*Howard, Stanley L.
Isaac, Frank R.
Kemp, Wilbur
Kelly, Paul B.
Klawans, Edward
Kohner, Emanuel
*Krieger, Joseph E.
Lang, George E.
Lapetina, Peter
Lawrence, William R.
Linhardt, Otto C.
*Linthicum, Maynard J.
Mealy, John K.
Merritt, J. Levering
Messersmith, Paul
Michael, H. Osborne
Milhiser, Robert
*Mosher, William B.
Mullikin, Cecil H.
Nitzberg, Frank
Poehlman, James E.
Price, Augustus R.
Rice, John Wade
Robinson, Harry L.
Sarbacher, William H.
Schad, Theodore G.
Schmidt, Henry R.
Schwartz, William F.
Seippel, John H.
Shilovitch, Nathan
*Silberstein, Eli
*Sloman, Harold
Spencer, Raymond D.
Steinwedel, Edwin A.
Stokes, John A.
Stoudenmire, Lawrence
*Strobel, Payton B.
*Talkin, Harry
*Taylor, R. Corbin
Tilman, Daniel W.
*Trigg, Charles W.
Von Eiff, Herman A.
*Ward, Henry Clay
Ward, Wilbur F., Jr.
Weant, Clarence H.
Weeks, Walter E.
Whitcomb, Kenneth F.
Willhide, Paul A.
Wilson, Vance Vernon
Wolman, Sidney N.
Wrenn, J. Edwin
Young, E. Carl
Zimmerman, Emmett H.

MID-YEAR CLASS OF 1915—59 MEMBERS.

Adams, Albert C.
Benson, John O.
Breyer, Ralph
Buxton, Nelson
Carmichael, George W.
Collison, Vernon
Dempster, John S.
Denhard, Leroy
Dischler, Gordon
Duck, William E
Gillespie, James M.
Gompf, John W.
Green, Fred.
Greenwald, Sidney
Hamill, Frank J.
Harris, Robert T.
Hart, Robert M.
Haskell, Lee C.
Hedrick, Melvin
Heinmiller, Howard
Heinmiller, Paul
Hess, J. Elmer

Hogg, John W.
Jackson, W. Irvin
Joyce, Temple N.
Kalling, Lewis J.
Kaufholz, Robert M.
Keagle, Walter J.
Kellner, H. Irvin
Knabe, Carl L.
Krotee, Benjamin A.
Leonhardt, Milton D.
McAuliffe, Cornelius
McGinnis, Herbert
McGinnis, Joseph
Milbourne, E. Russell
Morrison, Walter H.
Neavitt, E. Hall
Patzschke, William C.
Pfeifer, Raymond S.
Price, Alan
Renno, Arthur A.
Robinson, Jenkins A.
Schobel, Charles O.
Shew, Harry F., Jr.
Smart, Landon
Stromeyer, William F.
Stumptner, A. G.
Summers, Lindner T.
Talbot, George C.
Thayer, James S.
Thiess, Ferdinand F.
Tregoe, Benjamin
Walter, Jasper
Weinberg, Samuel
Welsh, Raymond M.
Whiteman, Rogers C.
Williams, Jesse
Ziefle, H. Paul

CLASS OF 1915—141 MEMBERS.

Adams, Arthur J.
Andersen, Gunnar W.
Anderson, Richard W.
Anger, Albert E.
Armiger, William J.
*Ballard, Donald D.
Bauernschmidt, R. L.
Beethma, Curtis
Bentz, William L.
*Bitter, Kenneth O.
Bittorf, Henry J.
Blaustein, Herbert
Blazek, Charles J.
Bloom, Abraham
Bourne, Earl T.
Braun, Christian
Brill, Charles N.
*Burgess, Harry J.
Caldwell, Lee R.
Callowhill, Harold S.
Chipman, Joseph
Chism, Edward K.
Constam, Henry
Crawford, William F.
Currie, Kent D. D.
Cushen, Harry P.
Davis, Allen V.
Denhard, Elbert E.
Dietz, Harry H.
Eisenbrandt, Fred.
*Eisert, L. William
*Elsnic, Frank
*Erck, Charles F.
*Esterson, Max
Feldmann, Walther H.
Finkelstein, Isidore
Fredl, Edward F.
Fusselbaugh, Robert, Jr.
Garrett, Roland
Gier, Frank

Givner, Abraham
*Glaser, Alfred W.
Glick, Morris
Goldstein, David
Gompf, George
Greenbaum, Isaac
Haile, Leroy Y.
*Hampsher, William L.
*Hardin, John R.
Harrison, Horace B.
Haskell, Crawford R.
*Hauer, Harry E.
Hauswald, Carl C.
Herr, Robert M.
Heuisler, Harry
Hipsley, Preston
*Holden, Urban S.
Hollstein, Arthur W.
Horlebein, Edwin W.
Houck, Frank G.
*Hunt, James
Jenkins, Leonard D.
Jennings, Carey
Joyner, Norman
Kempler, Thomas G.
Klemm, Gustav W.
*Klunk, Frank
Knecht, John
Knoop, Fred.
Krotee, Harry
*Krug, William F., Jr.
Lampe, John H.
Lauten, William B.
*Laux, G. August
Lawrence, J. H.
Lawrence, Wallace
Lehr, William E.
Longley, Edward L.
McDonald, George
McDonough, A. Wilford
McGinnis, Charles A.
McLeod, David R.
McQuinn, Charles E.
Manger, Charles E.
Miller, Harold F.
Moeser, William
Mohlhenrich, Henry C.
Moltz, Leonard C.
Moore, William W.
Morrison, Herbert K.
Neal, Roland W.
Necker, Louis
Novak, Frank
O'Keefe, John J.
O'Neill, George E.
Onion, J. H.
Oppenheim, Maurice
*Paige, Edmund R.
Peters, Stuart A.
*Petrick, Edward
*Pfaff, Rudolph
Picker, Kumbert
*Pivarnick, Eli
*Preston, Charles R.
Prince, Henry L., Jr.
Quick, Roland S.
*Rede, George R.
Reimer, John
Rhode, Russell M.
Rohowiski, Joseph, Jr.
Rosenthal, Jacob S.
*Sabsewitz, Benjamin S.
Schmidt, Carl W.
Sellman, Lee W.
Seltzer, Eugene P.
*Sheely, Raymond
Sherwood, Irving
Singewald, Paul H.
Slasman, William H.
Smith, Charles G.
Smith, Robert F., Jr.
Snyder, W. Overton, Jr.
Startzman, Henry H.
Stewart, William L.
Struven, Albert L.
Thompson, Charles L.
Thompson, Lawrence
Townsend, Francis H.

Townsend, Guy
Trimble, James R.
Warren, Wilson C.
Waters, Murray G.
Weil, Joseph
Wessels, Walter B.
Wherley, Clarence V.
White, Herbert E.
*Whitehill, Morton S.
Wiland, Luther
*Wolf, Herman
Wright, Randolph K.
Young, Douglas E.

MID-YEAR CLASS OF 1916—63 MEMBERS.

Baer, Bankard F.
Bassett, D. Marion
Bishop, Russell G.
Bowen, John W., Jr.
Bramble, Arthur E.
Brown, Stewart
Burner, Russell K.
Carroll, J. Earl
Compton, Key
Cooling, Henry L.
Crout, Marvin M.
*Dehler, Frank
Dennis, Percy D.
Dinkelman, Carl M.
Ensor, William L.
Erck, Henry G.
Freeman, H. Gresly
Gilpin, Levering
*Greenspun, Joseph
Gressitt, William G.
Grieb, Christian
Harden, William C., Jr.
Hebbel, Emil E.
Hebbel, Julius
Heller, Morris S.
Hess, Leslie H.
Hohman, Conrad
Kaspar, Charles J.
*Keese, Maurice J.
Kenney, Raymond
Korpman, Walter W.
Lean, James T.
Luckett, R. Wilson
Lutzky, Bernard
Munroe, Everett
Naeny, Albert H.
Noha, Charles M.
Ortman, Carl C.
Ostheim, H. Seibert
*Pearson, William P.
Phillips, George T.
Poehlman, George I.
Powell, John
Sanner, John W.
Schimmel, Richard
Sener, Beverley T.
Sinclair, Preston S.
Sinclair, Walter P.
Smith, Raymond C.
Smith, William A., Jr.
Strehlau, William F.
Thompson, Charles E.
Tilghman, Robert N.
Tucker, Albert L.
Turner, Robert G.
Vernay, Walter H.
Von Schulz, William M.
Wallace, Charles E.
Walter, Charles
Weinberger, John
White, Chester
Woodall, Robert E.
Wooden, Emory

CLASS OF 1916—263 MEMBERS.

*Albrecht, Vernon J.
Alrich, Edward
Alvey, C. Walter
Anderson, Charles D.
Applestein, Frank
Auld, Hugh
Baker, Eli
*Baker, Harold D.
Bauer, Charles M.
Berlin, Hyman
Berlin, Max
*Berry, Morris
Betz, Norman J.
Binns, Edwin V.
Black, Frank E.
Blackburn, S. C.
Bloomsburg, Harry E.
Blum, Nathan S.
Blunt, Samuel
Bock, Carl F.
Bolte, John Kirk
Bowen, James Gordon
Broadbelt, John E., Jr.
Brooks, E. Heath
Brown, Edgar K.
Bruggeman, Herman
Buckley, Charles H.
Bunnecke, George H.
Burgess, William
Burnham, DeVries K.
Calder, Albert K.
Cardegna, Frank A.
*Cassard, Louis L.
*Church, Clifford W.
Clark, DeKalb
Codd, William
Collins, Lewis, Jr.
Collins, William H.
*Cook, William D.
Countess, J. E.
Cowan, David, Jr.
Cowan, William T.
Cox, T. Newell
Crandell, Raymond A.
Culler, R. Lester
Davids, Bernard F.
Davis, Curtis F.
Davis, W. Ewell, Jr.
Denison, Alfred
Denmead, Arthur
Diehl, Richard S.
Dietrich, C. Reese
Dixon, H. Gist
*Douglas, RoscoeLane
Doyle, Bernard
Dreyer, Frederick
DuBreuil, Aristides
Duke, John B.
Eberly, Edward A., Jr.
Edwards, Paul W., Jr.
Elliott, Irving M.
Elste, Albert
Emich, W. Leonard
Erdman, Francis W.
Erdman, William R.
Fait, Leo H.
Fallon, Donald W.
Faupel, Stanley H.
*Fekl, Charles John
Field, Samuel S.
Fields, W. W.
*Finkelstein, Samuel
Fitzpatrick, Charles
Foreman, Carroll L.
Foster, Stanley
Franz, Rudolph E.
*Fulton, Franklin D.
Furst, Harold
Gail, Emil J.
Garbus, Louis
Garrett, Wilmer F.
Gatch, Thomas L.
Gemmill, W. Hamilton
Goldsmith, Max
Gore, William H., Jr.
Griffith, Joseph

Grubbs, Richard H.
Hall, Robert C.
Hall, Robert S.
*Hambleton, Richard W.
Hampson, G.
Hasenkamp, Edgar
Hastings, James W.
Hayden, Page
Hecklinger, Guy E.
Hertel, Albert
Herzog, Leroy
Hinds, William S., Jr.
Holmes, Richmond B.
Houghton, R. T.
Hubbard, Thomas F.
Hull, Arthur
Hunt, John J.
Iddings, Llewellyn L.
Ingham, W. Chesney
Jackson, Arthur L.
James, John A.
Jarvis, Carryl H.
Jasper, Felix
Johnson, Edward
Johnson, Joseph G.
*Johnson, Louis
Jones, Harold
Jones, John M.
Kairys, Harry
Kaiser, Charles A.
*Kaufman, Solomon
Kellner, Raymond C.
Kemler, James F.
Kerr, James Wilson
Kidd, William C., Jr.
King, C. Norwood
*Knecht, Andrew H.
Knipp, Howard F.
Koerber, F. W., Jr.
Kratz, Herman A., Jr.
Kueberth, Harry J.
Lamb, Roland H.
Lasinski, Frank P.
Lazarus, Nathan
*Lazenby, Marion
Lentz, Valentine
Lipschutz, Louis
Littleton, Oliver W.
Long, Albert T.
McComas, J. Roland
McCullough, Enoch S.
McDairmant, John
McDonagh, Clarence O.
*McShane, Ralph E.
Mahaney, Wesley J.
Malambre, Guy
Manfuso, J. Guy
Martenet, St. Clair
Meikle, J. Donald
Meissel, Howard A.
Merriken, William
Michael, Carl
Miller, Harry A.
Miller, Harry M., Jr.
*Miller, William R.
Mills, William N.
Mohlhenrich, R.
Moore, Frank G.
Moore, J. Duncan
Moore, Robert S.
*Mueller, George R.
*Mullan, Evans
Mullen, Herbert
Muller, William Edwin
Neumann, Bruno F.
New, Charles W., Jr.
Norris, John Victor
Orne, Stephen W.
*Parsons, Albert B.
Passano, Leonard
Pawley, Howard
Peoples, Grant.
Pertsch, Charles
Plaskitt, James M.
Plassnig, Edwin
Platt, Louis
Pohl, Walter F.
Pohmer, Albert

Poteet, Powell
Ratcliffe, Eulon
Rauschenbach, Charles E.
Reier, Paul G.
Reilly, Donald
*Reynolds, Leroy C.
*Rice, Emory
Ridgeway, Norris
Rinn, Henry F.
Roberts, Arthur W.
Rocklin, Harris
Roebuck, T. Harris
Rosenblatt, Samuel
*Rosenfeld, Benjamin
Roskes, David
*Salter, Ernest H.
Schapiro, Louis
Schiaffino, Aurelio
Schloer, Frank X.
Schroedl, Walter T.
Schultz, Frederick W., Jr.
*Schwanke, Herman A. B.
Schwartz, Charles H.
*Sebald, John L.
*Senner, Arthur H.
Seidewitz, Albert
*Shamburger, Joseph
Sheridan, Richard C.
*Shpritz, Nathan
Shreve, Arthur L.
Shriner, Clarence E.
Shroyer, Maurice
Silberstein, Samuel
Slingluff, Harry
Smith, George O.
Smith, James I.
Smith, Sewell P.
Smoot, Barton
Snyder, Edwin A.
*Sonneborn, David B.
Spedden, John C.
Stewart, W. C.
Strasser, Edward F.
Swartz, James M.
Swartz, Richard P.
Taylor, Arthur
Tharle, Herbert
Thayer, William C.
Theler, Sherwood D.
Thomas, Harry
Thomas, William E.
*Tilghman, R. Houghton
Turner, Thomas W.
Upton, William K.
*Vickers, J. Kennedy, Jr.
Vogel, H. H.
Waddell, William
Wagner, Herbert W.
Walker, Holcombe
Watkins, John Wilbur
Weatherby, Newton T.
*Weaver, Francis P.
Webb, A. William, Jr.
Weigand, Philip
Weil, Louis
Weiskittel, Francis
Wells, Clifton K., Jr.
Westerfield, Benjamin
Wheeden, H. Ford
Wheeler, George J.
White, John G.
Wiesner, Henry F., Jr.
*Williams, Carroll
Williams, John W.
Willis, Charles F.
Winters, John E.
Wohlgemuth, Christian
Wolf, DuPont L.
Wood, Robert L.
Woolford, Charles M.
Worthington, Lester F.
Wright, J. Norman
*Wright, Sumner B.
Wrightson, Henry
Wroten, John
Young, F. Elmer
Young, Nelson
Zenitz, Nelson
Zerhusen, Henry, Jr.

MID-YEAR CLASS OF 1917—126 MEMBERS.

Armstrong, George E.
Barnette, Dudley K.
Beutelspacher, W. S.
Blaha, Charles S.
Blenkner, C. H.
Bolton, L. Stewart
Bond, Stanley
Brasse, Charles W.
Brown, Robert E.
Bull, William R.
Burroughs, W. Dwight, Jr.
Bye, H. Burton
Callahan, Joseph
Cann, Bertram
Chatterley, D. W.
Childs, G. Ellwood
Colliflower, H. E.
Colton, William L.
Corse, Norris
Crafton, J. B.
Cummings, J. Earl
Denmead, Francis, Jr.
Dietrich, J.
Diggs, Austin O.
Dolliver, Allan
Dorsey, Arthur G.
Dorsey, James K.
Earp, Arthur C.
Ehrlich, Roger U.
Eisenberg, Paul
Ewing, Leroy C.
Fairbank, Charles W.
Fairbank, Ralph W.
Feast, Harry C. L.
Ficht, Carl E.
Finley, J. N. G.
Fissel, Edwin J.
Fowler, Carville J.
Gallagher, John B.
Gallagher, Joseph Gordon A.
Geis, J. Hammond
Goodman, Reuben
Gordon, Alan
Gorrell, P. R.
Green, Edward James
Greenbaum, Leon
Grice, C. E. St. Elmo
Gummer, Edward G.
Hardy, Edmund
Hentzschel, Walter
Henze, Charles W.
*Herring, Frank W.
Herring, Wilbur
Herrlich, Granville L.
Hibbitts, John
Hickey, Louis T.
Himler, Luther P.
Himes, William
Honig, Albert
Houghton, Ralph E.
Hull, Cyrus W.
Husted, Mortimer I.
Hyman, George W.
Kaufman, Frank August
Kern, W. William
King, John Bailey
Koch, Howard S.
Labai, Adam
Lambdin, Arthur L.
Laughlin, James E.
Letzkus, George E.
Levy, Abraham
Loetell, Albert W.
Ludwig, Albert E.
McComas, G. Livingston
McCracken, Willard
McGuire, John
Mahool, John B.
Maginnis, Wm. Stuart
Maguire, Joseph
Meade, Arthur C.
Mirvis, Jacob
Mole, Rodney
Morganstein, Morris

Mullen, Vernon
Mund, Charles H.
Murray, Edwin E.
Neiman, Herman
Oler, Albert W.
Parks, Richard W.
Paulus, Albert Mathias
Pillsbury, Harold
Pohlman, J. V.
Quarles, Giles W.
Rasch, George C.
Ray, Lyle C.
Reynolds, Milton L.
Richmond, Sidney L.
Robinson, Augustus O., Jr.
Roche, Clinton B.
Roypen, Meyer
Ruhl, Carl C.
Schad, Charles I.
Schaffer, Chester D.
Schlosser, Louis
Shriner, Nelson B.
Sibley, Leon T.
Smetana, Joseph
Smith, Anthony
Suter, Walter
Thiess, C. H.
Thomas Benjamin F.
Thompson, Edward L., Jr.
Thomson, Clarence J., Jr.
Tippett, Freeman F.
Tumbler, Joseph
Turner, Conner
Viessman, Warren
Walker, Stanley B.
Wanicek, John
Weise, Andrew
Wells, Ralph Norris
Wiegand, William
Wilson, William
Ziegler, Fred.
Ziegler, Harold B.

CLASS OF 1917—451 MEMBERS.

Abbott, C. Webster, Jr.
Abbott, S. Bryan
Acker, Swope
Adams, Lawrence W.
Adler, Maurice
Amick, William Edward
Andrae, Carl H.
Appleby, Edward H.
Armstrong, J. Arthur
Atkinson, Frank Vernon
Atkinson, Robert, Jr.
Ault, E. Stanley
Baer, Alfred
Baker, Foster N.
Baker, Irvin
Ball, Wilmot C.
Baltz, Charles A.
Bamber, George R.
Barrett, C. A.
Barrow, Thomas H.
Barssock, Morris
Bassford, Norman L.
Bassford, Wallace L.
Bast, Herbert N.
Batchelder, Harry B.
Battee, Roy
Baughman, LeRoy Bernard
Baumann, Frank
Bavis, Edward M.
Beale, Renford
Bechtold, Charles A.
Beiswanger, Elmer John
Belt, Samuel C.
Benson, Charles Wilbur
Bercowitz, Moses
Berger, Roland

Berman, Benjamin
Berman, Hyman A.
Bernstein, Joseph
Berry, Thomas L., Jr.
Bevans, Bertie Bennett
Beyer, Charles L.
Bichow, Solomon
Billig, Abraham
Blimberg, Walter E.
Block, Bernhard
Bohnlofink, Edward
Boone, James Earl, Jr.
Bopst, John H., Jr.
Borenstein, Harry, Jr.
Bortner, Bennett B.
Bourne, Kenneth
Boyd, Charles Holmes
Brandt, Harry
Brannan, John
Broady, Louis M.
Bromwell, Earl
Brown, Edward
Bruns, Eugene W.
Buchheister, George E., Jr.
Buddemeier, Harry W.
Bull, John A.
Bull, Russell E.
Buschman, Frank W.
Caplan, Philip
Carre, Stafford W.
Cavey, Thomas M.
Chapman, James M.
Chenowith, G. LeRoy
Chittenden, Curtis
Cincotta, Joseph
Clarke, Judson
Cleary, Charles H.
Cleghorn, Raymond R.
Clifton, Nelson
Codd, James L.
Codd, Joseph A.
Cohen, Thomas
Compton, Keith
Cook, Carl
Costello, Wm. Francis, Jr.
Coughlin, Joseph E.
Courts, Albert Earl
Cover, Woodland
Craig, William Louis
Crist, M. Edward
Crist, William
Crist, William C.
Criswell, Henry
Cromer, Forest Grant
Crouch, Harry
Crouse, William S.
Crownfield, Frederic R.
Cummings, Carl E.
Cummins, Harold M.
Davis, Milton C.
Davis, Stanley
Day, L. John
Deal, James
Delaney, Joseph
Demarest, Ross
Diamond, Allan Lyle
Dietrich, Clarence
Dinsmore, Robert D.
Disney, Edward Gordon
Ditman, Henry Lewis
Dolle, Eugene
Donhauser, George
Dreyer, Albert E.
Drohan, Leroy W.
Dudley, Robert
Edgar, Carroll D.
Eisenberg, Aaron
Eisenbrandt, Alexander
Emmerick, Norman A.
Erck, Denhard G.
Ernests, Charles Vernon
Eskins, Samuel
Eskovitz, Jacob
Fankhanel, LeRoy N.
Faraci, Samuel
Farring, Wiley George
Fenneman, Harry Ferdinand
Fiddis, William

Filling, Harry D.
Finkelstein, Abraham
Fleming, Charles
Flick, Walter
Ford, Franklin
Fox, William Norman
Franke, Harry
Fray, Thomas Leslie
Freedman, Nathan
Frerie, William C.
Fried, Louis
Frost, Harry
Gary, Leo Martin
Gayhart, Hall
German, Rodman I.
Giffin, Sidney Hudson
Gildea, John Henry, 3rd.
Givner, Nathan
Goetz, George
Goldberg, Samuel
Golder, Harry L.
Goldman, William
Goldsmith, Robert H.
Gordon, Charles V.
Gordon, Harry
Goren, Morris
Gorsuch, Richard G.
Gosnell, Clarence, Jr.
Graf, George Louis
Granger, Clarence
Granger, George R.
Greenberg, Israel
Grimmel, George J.
Gross, John J.
Grossman, Eugene E.
Haacke, William John
Hachtel, C. Leonard
Hajek, Millard
Hall, Roger F.
Hament, William
Hancock, Arthur C.
Hankofsky, Nathan
Hann, Charles B.
Hanzsche, Edward
Harper, J. Sylvester
Harrigan, Howard
Harris, Paul L.
Harrison, Joseph
Harvey, Harold LeRoy
Hasling, John
Hasson, William F. A.
Hawkins, Louis F.
Hax, E. Earl
Hechmer, George
Heise, L. Randolph
Hettleman, Isidore
Hewitt, Eli.
Hicks, Hugh Thomas
Higgins, Nevett G.
Higgins, Robert James
High, J. Norman
Hilgartner, Leonard H.
Hiltner, Millard
Hine, Joseph Emanuel
Hiss, Bosley
Hoffman, Solomon
Hohman, Allen C.
Hohman, Richmond
Hogan, W. J.
Holtgreve, Clarence E.
Hossbach, Joseph
Hottes, William
Hubbard, George A.
Hughes, William R.
Huppman, John M.
Hurley, E. L. H.
Israel, Naylor
James, Arthur V. L.
Janney, Charles H.
Jenkins, William
Johnson, Elmer
Jolly, William H.
Jones, Herbert M.
Judd, Harry D.
Kagle, Jesse L.
Kahmer, F. L.
Kane, Thomas Joseph
Kaufholz, William

Keen, George W.
Kehs, Warren Fred.
Kelley, Joseph J., Jr.
Kellman, Abraham
Kennedy, Bascom King
Kennedy, Kenneth
Kessler, Joseph
Keyes, Clifton L.
Kirchner, Christian
Klass, Louis
Knabe, Lloyd C.
Knipp, George A.
Koch, Charles
Kollmeyer, C. Albert
Kollmeyer, Robert
Korter, Charles J.
Krager, Charles H.
Kramer, Hyman
Krause, William F.
Kuff, Ephraim
Kulda, Edward J.
Lamb, Douglas A.
Lamb, Richard V., Jr.
Langrall, James H.
Leithauser, George H. E.
Leonard, S. Millard
Leslie, Fred. A.
Levenson, Samuel
Levin, Harry
Levinsohn, Meyer
Levis, Morris W.
Lewis, Francis McKee
Lewis, W. Mansell, Jr.
Lilly, S. Wilbur
Lindsay, Carey W.
Link, William
Livingston, Stanley O.
Lockwood, Henry
Loewer, Alvin C.
Long, Frank Clarence
Lotz, Calvin Henry
Lowes, James Tracey
Lucas, Charles
Lucke, Rudolph H.
McCaghey, William L.
McCauley, Hayward
McCauley, Nelson
McCubbin, Thomas King
McCurdy, Clarence P.
McDonnell, Paul A.
McElfresh, John L.
McQuinn, William
Maccubbin, W. Aubrey
Mace, Samuel N.
Mackert, Winfield R.
Mann, Ellsworth
Marks, William D.
Marley, Harvey Augustus
Maroney, William
Meads, Joseph K. T.
Messick, Kirwan Y.
Metz, Robert Milton
Miller, Berthold
Miller, Hugh
Mitchell, Alexander
Moeller, Herbert
Moran, Frank D.
Morgan, Charles G.
Morgereth, Philip F.
Morrison, Harry
Morrow, James Richard
Morrow, LeRoy Charles
Muessen, Anton S.
Mullikin, Howell B.
Murray, William
Myers, Eldridge
Nagengast, Alfred
Neuman, Benjamin
Newman, Cover B.
Newton, Bertram N.
Nicklas, Andrew F.
Norment, Clinton C.
Norris, Willard George
North, Raymond E.
North, Wallace S.
Norwood, John E.
O'Connor, Charles
Oehm, F. Arthur

Offutt, Harry L.
O'Keefe, William
Oldershaw, Aubrey Lee
Oppenheimer, Kirvin
Ortel, Elmer
Parker, A. Joseph
Parker, A. William
Pensmith, Lee
Pfaff, George John
Pitt, William Ray, Jr.
Plack, Edward
Platt, Edgar G.
Plitt, G. Percy
Potee, George N.
Powell, Edgar E.
Praeger, Clifford
Pritchard, Ross E.
Pritchett, Homer M.
Puepke, Robert
Pyfer, F. Elmer
Pyles, Kensett
Rabinowitz, Harry
Raffel, Daniel G.
Rawlings, Sidney G.
Rehling, Vernon
Reineke, Lester Henry
Ricker, Albert
Riddlemoser, Joseph
Riddlemoser, Robert
Riley, Harry
Riley, William J.
Ripple, Frank E.
Ritter, Howard
Robertson, Frank D.
Roche, Patrick J.
Roesch, George
Rolker, William H.
Rosenblatt, Hudson
Rosenthal, Joseph
Rossman, Edward
Rouchard, Edward F.
Russell, Joseph E.
Rutherford, Earl C.
Sachs, Harry M.
Sadtler, William B.
Sagal, Marcus
Sanderson, Gustav F.
Sanner, Roland B.
Sauers, William S.
Schaefer, Neal
Schaffer, Carl
Schaffer, Charles
Schaffer, Isidore
Scheer, J. Norman
Scherer, George
Schleisner, Samuel
Schmidt, Harry B., Jr.
Schneider, Frederick
Schulz, William L.
Scott, T. Parkin
Scrivner, DeLancey
Sebald, William Francis
Seibel, Louis
Seibert, Henry
Sellman, Pere Hanson
Sendelbach, Frederick J.
Sener, Robert W.
Seth, Joseph
Shaftel, Joseph
Shambach, Franklin
Shatzer, Herbert
Shehan, Daniel E.
Shelley, Franklin C.
Silberstein, Samuel M.
Silesky, Abraham
Simpson, Ephraim
Sinclair, Edward G.
Slingluff, Arthur
Smith, Albert VanDeaver
Smith, James T.
Smith, Louis
Smyrk, Charles E.
Snyder, Frank Leo
Sperow, Charles E.
Stairs, George
Stallings, G. Elias
Stansbury, William C.
Steiner, Edward Everett

Stewart, James M.
Stoll, Raymond H.
Storm, Vernon
Straub, George E.
Strauss, Hyman
Strant, Max
Sugarman, Abraham J.
Summers, F. B., Jr.
Sunderland, Pearson
Tames, Charles H.
Taylor, Henry Leary
Thomas, Alphonso
Thomas, Claude V.
Thomas, Milford J.
Thorington, M. Graham
Thrasher, Richard B.
Tobin, James LeRoy
Tome, Richard
Torsch, Frederick F.
Tower, William Arthur
Towner, William B.
Traverse, Edwin H.
Tribull, Emil
Trout, Jerome B.
Tucker, Albert P.
Ulrich, Francis V.
Van Daniker, Ernault
Vail, Austin F.
Vansant, Ross
Vincent, Carroll J.
Vincent, Wilbur S.
Vogt, Guilfred
Wagener, August
Walshe, Charles
Wann, Ernest
Warfield, Laurence L.
Watkins, Douglas C.
Watson, Robert
Watts, Bushrod R.
Weedon, D. Eugene
Wegant, Frederick
Weifenbach, Herbert E.
Weikel, C. Edwin
Weiskittel, Herbert
Wells, Howard B.
Wensk, Joseph A.
West, Charles R.
Westerman, Andrew B.
Wheeler, Edward
Whitehouse, Hayes
Wiedeman, Otto
Wilhelm, John Philip
Williams, J. McC.
Wilson, Clarence H.
Wimmer, Elmer Paul
Wittig, William
Woelper, Edmund F.
Worden, Chester
Yewell, Earl
Young, J. Albert
Zeman, Charles
Zepp, George E.
Zile, Ralph

MID-YEAR CLASS OF 1918—112 MEMBERS.

Anderson, Frederick L.
Bailey, Claude A.
Ballard, Robert F.
Barr, Harold T.
Bartholome, Theodore M.
Benson, William T.
Bernstein, Harry A.
Betz, Samuel W.
Boellmer, Otto C.
Bond, Eugene A.
Borcherding, Edwin J.
Brown, Harvey
Cabe, Melvin Roy
Caldwell, John G.

Campbell, Malcolm J. C.
Carter, Ernest W.
Cohn, Michael
Coursey, Robert E.
Cranmer, Walter B.
DiDomenico, Anthony F.
Dixon, Allan Rhodes
Eck, Clinton B.
Edelson, Leon
Ehlers, Arthur H.
Epple, Morris A.
Everngam, Howard S.
Evert, Lawrence L.
Flax, Henry J.
Flom, Isaac
Fogwell, J. Barton
Foutz, Douglass
Gallagher, William J. A.
Garmatz, Herman M.
Geer, Alfred B.
Goertz, Walter
Gordon, Eugene
Griffith, F. Gilbert
Griswold, Arthur
Guier, Thomas M.
Habbersett, William C.
Hartzell, Roger H.
Helm, John Beal
Hemmick, Wheatley N.
Henninghausen, Louis
Hobbs, G. Vernon
Hoffmeyer, Charles G.
Honeman, Kenneth E.
Horner, Clyde L.
Hyder, Raymond
Joh, Clarence
Johnson, M. Earle
Jones, Everett T.
Jones, Harry L.
Kaiss, Henry John
Kaufman, Carl P.
Kegan, Richard
Kellinger, Albert C.
Kemp, Edwin
Kotmair, Joseph
Kress, George K.
Lee, Hutson
Legg, Chauncey M.
Leitner, Clarence Wells
Leland, Robert Sullivan
McClelland, Robert P., Jr.
Macleod, Donald D.
Mangold, William S., Jr.
Mercier, Newton
Moore, W. Hanson
Murray, George C.
Neale, J. Shorb
Neavitt, Harry C.
Newton, Harry J.
Norman, O. B.
Oler, Howard S.
Peyton, William F.
Plisetsky, Henry A.
Plitt, George E.
Pohl, Frederick B.
Raith, Robert M.
Ranney, William
Reckitt, Earl W.
Reins, William E.
Rice, Gustavus B.
Richardson, Armand H.
Roche, George J., Jr.
Scheidt, Melvin E.
Schmidt, Leroy H.
Schmidt, William R.
Schnepfe, Howard A.
Schroeder, George W.
Scott, Alfred B.
Scott, Arthur R.
Selway, Harvey W.
Shilovitz, Abraham
Snyder, Russell
Sobelman, Solomon
Starkey, L. Maurice
Steinfelt, William J.
Stricker, William T.
Townsend, Leslit Y.
Wagner, J. Robert

Wallace, Mason L.
Walter, Ernest Wm.
Webb, Julian S.
Weedon, Hugh H., Jr.
Wesley, William E.
Whelpley, Milton E.
Wilkins, Archie
Winters, George
Yeakle, Ronald G.
Zimmerman, Robert D

SUMMARY OF ENROLLMENT.

Mid-Year Class of 1914	26
Class of 1914, A Class	86
Mid-Year Class of 1915, A-x Class	59
Class of 1915, B Class	141
Mid-Year Class of 1916, B-x Class	63
Class of 1916, C Class	263
Mid-Year Class of 1917, C-x Class	126
Class of 1917, D Class	451
Mid-Year Class of 1918, D-x Class	112
Total enrollment	1,327

CLASS ORGANIZATIONS.

CLASS OF 1914—A CLASS.

President.....C. E. Bristor.
Vice-President.....Harry Robinson.
Secretary.....Theodore Schad.
Treasurer.....Clarence H. Weant.

MID-YEAR CLASS OF 1915—A-x CLASS.

President.....Jesse Williams.
Vice-President.....R. S. Pfeifer.
Secretary.....Arthur Renno.
Treasurer.....Temple N. Joyce.

CLASS OF 1915—B CLASS.

President.....Edmund R. Paige.
Vice-President.....R. Fusselbaugh, Jr.
Secretary.....J. R. Hardin.
Treasurer.....Leonard C. Moltz.

MID-YEAR CLASS OF 1916—B-x CLASS.

President.....W. P. Pearson.
Vice-President.....R. G. Bishop.
Secretary.....Julius Hebbel.
Treasurer.....Albert Naeny.

*CLASS OF 1916—C CLASS.

President.....R. W. Hambleton.
Vice-President.....J. R. Wroten.
Secretary.....S. B. Wright.
Treasurer.....Fred. W. Schultz, Jr.

MID-YEAR CLASS OF 1917—C-x CLASS.

President.....G. L. McComas.
Vice-President.....A. Lambdin.
Secretary.....F. Herring.
Treasurer.....E. Murray.

CLASS OF 1917—D CLASS.

President.....F. L. Kahmer.
Vice-President.....M. E. Crist.
Secretary.....A. Smith.
Treasurer.....C. W. Abbott.

*The Class of 1916 began the second year of its organized existence by electing to pay monthly dues, the aggregate of which, at the date of graduation in 1916, is to be expended in partly decorating, in an appropriate and approved manner, the corridors of the new building.

BOARD OF STUDENT ACTIVITIES.

It is the aim to conduct the student activities of the school under teacher supervision, so that the adage "All for each and each for all" may reach the maximum of realization. The student body is represented on the board by the presidents of the third and fourth year classes. The activities and their representatives are:

At large.....The Principal and Vice-Principal.
Finances.....Mr. Platt.
Football.....Mr. Bolgiano.
Baseball.....Mr. Magness.
Track.....Mr. Anderson.
Polo.....Mr. Dehuff.
Basketball.....Mr. Broadbelt.
Marksman.....Mr. Platt.
Swimming.....Mr. Bolgiano.
Lacrosse.....Mr. Ranft.
Tennis.....Mr. Hobbs.
Lowell Literary Society.....Mr. North.
Poe Literary Society.....Mr. Stedman.
Franklin Literary Society.....Mr. Porter.
Dramatics.....Messrs. Stedman and Dehuff.
Music—
Vocal and Instrumental...Messrs. North, Dehuff and Hobbs.

STUDENT REPRESENTATIVES.

Fourth Year Class (February).....Louis Weissing.
Fourth Year Class (June).....Charles E. Bristor.
Third Year Class (February).....James N. Gillespie.
Third Year Class (June).....Edmund R. Paige.

LITERARY SOCIETIES.

The "Lowell."

President.....Gordon K. Bishop, '14.
Vice-President.....Herbert H. Blaustein, '15.
Recording Secretary.....Harry Greenberg, '14.
Corresponding Secretary.....George C. Coursey, '14.
Treasurer.....Kenneth S. Cullom, '14.
Reporter.....Sidney R. Greenwald, Mid '15.
Sergeant-at-Arms.....Frank Crist, '14.
Senior Critic.....J. Owings Preston, Mid. '14.
Faculty Critic.....Mr. Samuel M. North.
Executive Committee.....Ralph A. Bloomsburg, '14.
Charles Trigg, '14.
The President, *ex officio*.

The "Poe."

President.....Edward Klawans, '14
Vice-President.....F. Gloyd Awalt, '14.
Secretary.....John Wade Rice, '14.
Treasurer.....J. Levering Merritt, '14.
Reporter.....Frank R. Isaac, '14.
Historian.....Theodore Schad, '14.
Librarian.....Edwin A. Steinwedel, '14.
Sergeant-at-Arms.....Charles E. Bristor, Jr., '14.
Critic.....Mr. William P. Stedman.
Executive Committee.....Frank R. Isaac, '14.
Charles E. Bristor, '14.
The President, *ex officio*.
Business Committee.....Harold Sloman, '14.
Paul A. Willhide, '14.
The Vice-President *ex officio*.

On March 28, 1913, in the Eastern High School, the Poe, for the fifth consecutive time, defeated the Bancroft Literary Association of the Baltimore City College in debate for the annual interscholastic championship. The subject was: "Resolved, That the legal voters of Maryland should be permitted to use the Initiative and Referendum in the enactment of all public general laws." The Poe, upholding the affirmative, was represented by Messrs. Edward Klawans, Louis Meyerhoff, R. Lee Porter and Robert Harris, (alternate).

Another debate with the Bancroft will shortly take place, when the subject will be: "Resolved, That for Maryland a single tax, on land values only, as is provided for in the theory of Henry George, is preferable to our present system of taxation." The Poe will again uphold the affirmative.

There will also occur, during the current season, a series of contests with the Lowell Society, the purpose of which will be to gain possession of the Polytechnic trophy, a silver cup, now held by the Lowell.

The "Franklin."

Upon resuming work for the session of 1913-1914, the "Adelphia" literary society changed its name to "Franklin."

The society is planning to give, in the spring of 1914, its first dramatic entertainment which, it is believed, will prove as popular and of as high a degree of excellence as those rendered heretofore by the various Polytechnic student organizations.

The officers of the "Franklin" are as follows:

President	Frank M. Lazenby, '16.
Vice-President	Sumner B. Wright, '16.
Recording Secretary	Richard W. Hambleton, '16.
Corresponding Secretary	Lowry Cooling, Mid '16.
Treasurer	David B. Sonneborn, '16.
Sergeant-at-Arms	Carroll Williams, '16.
Faculty Critic	Mr. H. P. Porter.
Executive Committee	Richard W. Hambleton, '16.
	William P. Pearson, Mid '16.
	David B. Sonneborn, '16.
Play Committee	Warren Viessman, Mid '17.
	Charles F. Willis, '16.
	Roland Lamb, '16.
	Sumner B. Wright, '16.
	Webster Turner, '16.

THE POE-LOWELL JUNE PLAY.

The Poe and the Lowell Literary Societies combine each year to present some dramatic performance during the commencement week. In doing this they are actuated by the desire not only to benefit themselves intellectually by the training they receive in preparing for and in producing their play, but also by a desire to give to their friends a pleasant evening, and to bring before the people of Baltimore the literary activities of the Institute.

"Secret Service," a four-act play by William Gillette, was presented by the combined societies, at Albaugh's Theatre, on the evening of June 13, 1913. The cast was a large one, and was arranged as follows in the order of entrance:

Miss Kittridge	Lee R. Caldwell, '15.
Wilfred Varney	W. H. Morrison, '14.
Martha	Sidney R. Greenwald, Mid '15.
Mrs. General Varney	Harry A. Collett, '13.
Edith Varney	Charles E. Wallace, '15.
Jonas	Joseph D. Lazenby, '15.
Lieut. Maxwell	John Wade Rice, '14.
Lewis Dumont (known in Richmond as Capt. Thorne)	Robert T. Harris, Mid '15.
Caroline Mitford	Harold J. Sloman, '14.
Mr. Benton Arrelsford	Frank Cesky, '13.
Henry Dumont	J. Levering Merritt, '14.
Lieut. Allison	Clarence H. Weant, '14.
Lieut. Foray	Cayetano Panettiere, Mid '15.
Lieut. Tyree	William B. Hoke, '14.
Lieut. Ensign	Harold O. Hogan, '14.
Sergeant Wilson	Isaac Poloway, '13.
Sergeant Matson	David R. McLeod, '15.
Gen. Nelson Randolph	Solomon Cohen, '13.
Orderlies	Samuel Wilner, Mid '16. Edward Klawans, '14.
Messengers	Warren Viessman, Mid '17. Edwin G. Yearley, Mid '14. William B. Lauten, '15. Edwin A. Steinwedel, '14. John Benson, Mid '15. Leroy Y. Haile, '15.
Eddinger	Karl F. Tille, Mid '16.

THE JUNE PLAY COMMITTEE OF 1913.

Mr. William Perry Stedman.....*Director.*
W. Taylor Abercrombie, '13.....*Chairman.*
Robert T. Harris, Mid '15.....*Secretary-Treasurer.*
E. Russell Hicks, '14....*Costuming and Property Manager.*
Solomon Cohen, '13.....*Publicity Manager.*

Milton Reiner, '13. Thomas H. Hardinge, '14.
Joseph D. Lazenby, '15. Sidney Greenwald, Mid '15.
Vincent Panettiere, '13. F. Marion Lazenby, '16.
I. Luther Houghton, '13. J. H. Lau, '16.
J. J. White, '16.

THE MINSTRELS.

On December 19th the annual performance of the Poly Minstrels was given at Albaugh's Theatre before a very large and appreciative audience.

PROGRAM.

PART I.

SCENE—MAMMY JINNY'S YARD.

Mammy Jinny.....Robert T. Harris.
Uncle Nebuchadnezzer.....Thomas Hardinge.
Nebuchadnezzer, Jr.....D. Reilly.
Pickaninnies.....Albert Honig. James Smith.

Crap Shooters.....

Pillsbury.	Field.	Slingluff.
Woolford.	Jones.	Lauten.
Preston.	Harvey.	Dischler.
McLeod.	Bourne.	Benson.

Mandy, daughter of Mammy Jinny.....H. F. Miller.
Town Sport.....Henry Rodgers.
Advance Agent, Poly Minstrels.....E. Russell Hicks.
Assistants.....Gordon Bishop. Frank Langrall.

PART II.

Overture.....Entire Company.
Song—*Naughty Melody*.....Lyle Ray.
Dance.....Walter Keagle.
Song—*Garland of Old Fashioned Roses*..Redmond German.
Song—*Woodman, Woodman, Spare that Tree*..L. Magness.
Song—*And Then*.....Wallace & Harris.
Whistling Solo.....John Mealy.
Song—*Good Night, Little Girl, Good Night*...C. Williams.
Song—*Peg O'My Heart*.....Thomas Hardinge.
Song—*Dinah*.....Henry Rodgers.
Dance.....Temple Joyce.
Song.....Glee Club.
Song—*Bully Woolly Wild West Show*....William Bursnall.
Song—*Get Out and Get Under*.....Joseph Manfuso.
Song—*Tra la la la*.....Frank Waddell.
Finale.....Entire Company.

Committee.

Mr. Wilmer A. Dehuff.....*General Director.*
Thomas Hardinge.....*Manager.*
Gustav W. Klemm.....*Musical Director.*
Robert T. Harris.....*Program.*
E. Russell Hicks.....*Costumes.*

Orchestra.

Gustav Klemm.....*Director.*

E. Carl Young.....*Violin.*	Frank J. Hamill....*Violin.*
Peter Lapetina.....*Violin.*	Edwin Yearley.....*Piano.*
Walter H. Feldman..*Cornet.*	Foster N. Baker....*Cornet.*
Frank M. Shamback...*Flute.*	John J. Wanicek....*Drums.*

BASEBALL.

The Polytechnic baseball representatives of 1913, although they lost the interscholastic championship of the city, made a very creditable showing against the college teams of the State.

The Team.

O. Hamm, E. C. Reynolds ..... *Pitchers.*
R. W. Neal, J. A. Lutz, Jr ..... *Catchers.*
R. W. Anderson (*captain*) ..... *First Base.*
E. Ewell ..... *Second Base.*
J. Johnson ..... *Third Base.*
B. Baker ..... *Short Stop.*
D. Reilly ..... *Left Field.*
K. Kelly ..... *Center Field.*
R. K. Barnes ..... *Right Field.*

Substitutes: K. Chism, W. H. Gore, W. C. Wroe, P. Kelly, A. A. Renno and O. B. Pyle.

Messrs. Wilmer A. Dehuff and C. Fred Goob, Coaches.

Mr. Clarence P. Bolgiano, Manager.

The Record.

Polytechnic...	7,	Frederick High School.....	6.
Polytechnic...	3,	Western Maryland College.....	5.
Polytechnic...	1,	Baltimore International League...	16.
Polytechnic...	9,	University of Maryland.....	2.
Polytechnic...	4,	Washington College.....	5.
Polytechnic...	4,	Boys' Latin School.....	3.
Polytechnic...	5,	St. John's College Reserves.....	6.
Polytechnic...	4,	The Tome School for Boys.....	9.
Polytechnic...	6,	Baltimore City College.....	3.

Polytechnic...	19,	Catonsville High School..... 5.
Polytechnic...	6,	Frederick High School..... 0.
Polytechnic...	3,	Episcopal High School..... 5.
Polytechnic...	6,	Towson High School..... 1.
Polytechnic...	4,	Baltimore City College..... 9.
Polytechnic...	5,	Baltimore City College..... 6.

FOOTBALL.

The 1913 Poly football representatives formed the best balanced and most machine-like team ever representing the Institute. Coached and picked so that every player did his full share of the work, the team easily won the interscholastic championship of the city by defeating Baltimore City College 20 to 10.

The final and championship game was played on November 21st, before the largest and most representative assemblage ever gathered at Homewood Field, Johns Hopkins University. The game furnished many brilliant plays, the most spectacular of which was a wonderful forward-pass made by Ewell to Robinson.

The Team.

R. W. Anderson.....*Left End.*
H. Freeman and D. Reilly.....*Left Tackle.*
R. Fusselbaugh and V. Wilson.....*Left Guard.*
C. Michael.....*Center.*
R. S. Hall.....*Right Guard.*
R. C. Taylor.....*Right Tackle.*
L. Smart.....*Right End.*
F. Ewell, D. Fallon and J. Mealy.....*Quarterback.*
W. Stromeyer and B. Cann.....*Left Halfback.*
H. Day (captain) and J. Smith.....*Right Halfback.*
H. Robinson.....*Fullback.*

Substitutes: H. Shew, L. Taylor, L. McComas, N. Shilovitch, G. Plassnig, C. Smith, K. Compton, R. Herr and F. Denmead.

Mr. Frank Mellon, *Coach.*

Mr. Clarence P. Bolgiano, *Manager.*

Mr. Otto H. Hamm, *Assistant Manager.*

The Record.

Polytechnic...	6,	Mount Washington Club.....	12.
Polytechnic...	6,	Navy Plebes.....	19.
Polytechnic...	40,	Frederick High School.....	0.
Polytechnic...	20,	St. John's College Reserves.....	0.
Polytechnic...	20,	The Tome School for Boys.....	14.
Polytechnic...	7,	Episcopal High School (Va.).....	20,
Polytechnic...	20,	Baltimore City College.....	10.

THE MARKSMEN'S CLUB.

The object of the Markmen's Club is to create among the students an interest in markmanship, that branch of athletics which develops a steady arm, a quick eye and a manly self-reliance. It is composed of all the members of the school who can shoot, or who wish to learn to shoot.

The Club is a member of the Inter-City High School Rifle Shooting League of the National Rifle Association, composed of the rifle teams of high schools from all over the United States. Owing to the excellent record made by the B. P. I. during the season of 1912, it was placed in class "A," composed of the best nine clubs in the League. Our Club lost the range it used during 1912 and a new one could not be secured before the date set for the opening of the League

season. As a consequence our team was forced to shoot without sufficient preparation, resulting in the winning of only three of its nine matches.

The season closed with Poly in sixth place. Much credit is due Sargeant James E. Givan, Fourth Regiment, Maryland National Guard, for his efforts in coaching the team.

The team consisted of:

R. Lee Porter (Captain).
Arthur S. McCabe.
Clarence H. Weant.
Solomon Cohen.
F. D. Fulton.
O. A. Carr.
Charles R. Preston.
J. R. Hardin.
Donald D. Ballard.
Augustus R. Price.

TRACK.

The track season of 1912-1913 was the most successful in the history of the school. Members of the team won points in all of the important meets held in this section of the country.

Twice during the season were the colors of the Baltimore City College lowered by the mile relay team, first, in the Johns Hopkins-Fifth Regiment Games, and, second, in the Johns Hopkins Interscholastic Games. The relay team was composed of Jacobs (captain), Kelly, Chipman, Messersmith and Pyle.

Places won by the members of the team were:

J. Jacobs (captain), two first, one second and one third.
K. Kelly, one first, one second and one third.
J. Armiger, one first and second.
J. Chipman, two seconds.
P. Messersmith, one second and one third.
L. Disney, one second and one third.
O. B. Pyle, one third.

The team was entered in the following meets:
Johns Hopkins-Fifth Regiment Games.
George Washington College Games.
Georgetown University Games.
Maryland Agricultural College Games.
Johns Hopkins Interscholastic Games.
Middle Atlantic States Interscholastic Championships.
Mr. George N. Anderson, *Coach.*
Mr. Wilmer A. Dehuff, *Manager.*

LACROSSE.

The year 1913, while only the second season for lacrosse at the Polytechnic, was a great success. A schedule of seven games was arranged, but owing to the cancellation of two, only five were played.

The first game at Walbrook, which resulted in a four to three victory for the Walbrook team, was well played and gave promise of a bright future. The showing made against the Carlisle Indians was equally as good. By winning from their old rivals, the Baltimore City College, Polytechnic gained the interscholastic championship of the city. This success was due mainly to the coaching of Messrs. Ranft, Niles and Baldwin.

The Team.

Wilson, goal; Fusselbaugh, point; Day, coverpoint; Robinson, 1st defense; Herr, 2nd defense; Taylor, 3rd defense; Sellman, centre; Barrett, 3rd attack; R. Smith, 2nd attack; Heaphy, 1st attack; Wright (Captain), outhome; Moltz, inhome.

Substitutes: Messersmith, Joyce, C. Smith, Klemm, Bauernschmidt.

The following are the results of the games played:

April 5, Polytechnic..3, Walbrook.....4, at Walbrook.
April 12, Polytechnic..1, Carlisle.....6, at Carlisle.
April 23, Polytechnic..5, Hopkins Scrubs.2, at Homewood.
May 8, Polytechnic..3, City College...2, at Homewood.
May 10, Polytechnic..2, Mt. Washington.8, at Mt. Wash.

TENNIS.

The season of 1913 marked the admission of tennis to the group of athletic activities conducted by the Athletic Association. The team won three of the five scheduled matches of the season, exhibiting unusually good form in the Georgetown and in the City College contests.

There are strong reasons for believing that 1914 should place Polytechnic tennis upon the level of the skill and resourcefulness characteristic of the other officially supervised Polytechnic sports. The schedule already shows matches with Georgetown, Washington College, Gilman's, Park School, Tome, St. John's and City College.

The officers of the team are:

Captain: Vernon Collison, Mid. '15.

Manager: Mr. J. Vinton Hobbs.

POLO.

The 1912-1913 series of five games between the Polytechnic and City College resulted in the loss to Poly of the inter-scholastic championship.

The Team.

Joyce.....*Center.*
Greer.....*First Rush.*
Moltz.....*Second Rush.*
Day (Captain).....*Cover Point.*
Weaver.....*Goal.*

Substitutes: Heaphy, Wilson, Lawrence and Herr.

Mr. Harry How, *Coach.*

Mr. James B. Arthur, *Manager.*

The Series.

Polytechnic.....	0,	City College.....	4.
Polytechnic.....	0,	City College.....	3.
Polytechnic.....	2,	City College.....	1.
Polytechnic.....	3,	City College.....	1.
Polytechnic.....	1,	City College.....	5.

ELIGIBILITY RULES.

On March 12, 1914, the Principals of the City College and Polytechnic Institute, the two male secondary schools of Baltimore, agreed upon a code of rules which shall govern the eligibility of students of the two institutions to participate in athletics and in other competitions.

The Code.

1. Only those students who maintain a grade of scholarship satisfactory to the Principal shall be permitted to represent the school in competitions.

2. No student who has reached his twenty-first birthday shall represent his school in any competition.

3. No student under the penalty of discipline shall represent his school in any competition.

4. All post-graduates are ineligible for competitions, and no undergraduate shall be eligible for a longer period than four years from the date of his original entry, unless his graduation has been prevented one year by absence on account of sickness.

5. Only those students who are taking full work in a regular course (a minimum of 15 periods per week) shall be eligible to represent their school in any competition.

6. Only those students who are in good standing as amateurs shall represent their school.

7. The Principal of each school shall be held to have ultimate responsibility for the representatives of his school in all matters concerning inter-school contests.

8. All games shall be played on Fridays, Saturdays, or on weekday holidays.

9. All schedules and arrangements for competitions shall be made by members of the teaching staffs of the two institutions, and all officials shall be selected at least two days before a contest.

10. A member of the teaching staff shall manage the finances.

11. A student who does not attain a standard of attendance satisfactory to his Principal may not participate in any contest.

12. A student who enters school later than October 8th must have attended two months before becoming eligible to participate in any contests or competitions.

13. Each Principal shall supply the other within three days of the date of any competition a list of the regulars and substitutes whom it is proposed to use.

14. In all cases of students entering from other secondary schools, their records in such schools shall determine their eligibility in accordance with these rules.

15. February entrants, except they come from other high schools or by promotion from the elementary schools, are ineligible to contest until the following September.

CATALOGUE OF GRADUATES.

CLASS OF '87.

Clarence G. Bouis,
George C. Bump,
Lucien Dallam,
Otto H. Ehlers,
Osma K. Gardner,
Herbert F. Gorgas,
Joseph Greenbaum,
Henry W. Hahn,
Minor F. Heiskell,
Robert Hooper,
William S. Hugg,
Thomas J. Irons,
Joseph H. Kuehn,
P. Charles Nelson,
Flavius J. Pennington,
Richard Piez,
Henry M. Price,
Walter G. Reinicker,
William A. Robertson,
Albert Rosenberg,
James B. Scott,
Walter R. Sweeney,
James C. Thompson,
Adolphus Tiemeyer,
Frederick H. Wagner.

CLASS OF '88.

Arthur O. Badendrier,
Edward Binswanger,
Bernard H. Brooke,
Sydney S. Bouis,
Julius Fireman,
Thomas G. Ford,
George M. Gaither,
John H. Harvey,
Howard Harvey,
Walter J. Herman,
Joseph H. Hooper,
John P. Jefferson,
William Johnston, Jr.
William Mencke,
William F. Mylander,
Edwin F. Orem,
Edward B. Passano,
George E. Repp,
Harry E. Roberts,
George C. Robinson,
Hanson Robinson,
Robert E. Rodgers,
George H. Sickel,
Washington B. Stanton,
Orlando C. Weeks.

CLASS OF '89.

William F. Ackerman,
Samuel R. Adams,
Morgan H. Baldwin,
Arthur Gordon,
Ernest Griffith,
Isaac Behrend,
Joseph Isaac,
Louis H. Gerding,
Harry M. Ford,
Edward P. Cromwell,
John S. Hand,
Claiborne M. James,
Albert C. Layman,
Charles W. Leach,
J. W. C. Meikle,
Rozier L. Bouis,
Robert H. Buschman,
Charles C. Constantine,
Albert T. Barrett,
John L. Ehrman,
Allyn Field,
Howard Crosby,
George W. Moog,
John K. Mount,
Robert W. Peach,
Charles E. Phelps, Jr.,
William G. Robertson,
Robert C. Round,
Myron S. Rose,
William C. Siegmund,
Joseph Stiefel,
Harry P. Suman,
Carroll Thomas,

CLASS OF '90.

John F. Abendschein,
G. S. Barnes,
J. H. Bokee,
J. Edward Broadbelt,
W. H. Farinholt,
Chris. Feick,
J. Froelich.
William P. Gundry,
E. C. Harris,
J. C. Mattoon,
John D. Pugh,
A. O. Robertson,
William F. Schultz,
Michael D. Schaefer,
William P. Shriver,
Theodore Straus.

CLASS OF '91.

Walter Amos,
Basil Benson,
William Benson,
William Boucsein,
Morde Bren,
John J. Caine,
George Dannetel,
Charles Ehlers,
Ferdinand B. Keidel,
J. Edgar Knipp,
Samuel McNeal,
James C. Phillips,
Herbert M. Reese,
Edmund W. Robinson,
Reuben Row,
Warren S. Seipp,
N. D. D. Sollers,
Richard S. Warner,
William A. Young.

CLASS OF '92.

Edwin W. Antes,
John P. Baer,
Frank J. Borie,
B. Harrison Branch,
Leonard Burbank,
William C. Butler, Jr.,
Frank B. Hooper,
Edgar N. King,
John Langford,
Louis Liepman,
R. M. Miller,
J. W. Dawson, Jr.,
Royal R. Duncan,
Charles R. Durling,
Isidor Deutsche,
Walter H. Eisenbrandt,
William T. Holmes,
J. C. Miller,
Joseph Mullen,
William H. Rose,
Albert G. Singewald,
William H. Soine,
William E. Straus.

CLASS OF '93.

Theodore H. Ackerman,
Herbert Addison,
Oregon R. Benson,
Percy Thayer Blogg,
C. Raymond Carson,
William John Cochran,
B. C. D'Yarmett,
Henry M. Fitzhugh,
Clarence S. Hand,
James F. McChane.
Clarence F. Morfit,
F. H. Phelps,
Edwin Schenck,
John R. Uhler,
L. Ismay Van Horn,
Charles P. Weishampel,
R. L. Williams.

CLASS OF '94.

Edward H. Bell,
Albert E. Bowen,
J. Straith Briscoe,
Harry Cotton,
Carroll Edgar,
Frederick Kopp,
Philip Littig, Jr.,
Thomas Q. McGinn,
Herbert A. McGaw,
Horace J. Miller,
Louis Mueller,
George M. Parlett,
Charles Schlicker,
Alan P. Wilson,
John Zeubert,
Pliny Cutler Hall.
Edward J. Herring.

CLASS OF '95.

George W. Brown,
Clifton A. Coggins,
Harry W. Francis,
Graham B. Hall,
William W. Hogendorp,
Albert J. Hooper,
Frank A. Hornig,
Howard L. Hoskins,
Edward M. Likes,
Ward P. Littig,
Alfred F. Loeser,
Thomas J. H. Magness,
Herman F. Myer,
George N. Rogers,
Hamilton D. Ruth,
Richard F. Weishampel,
Carl A. Witthaus.

CLASS OF '96.

Samuel Hosea Armstrong,
Howard Douglas Bennett,
James Gomelia Boss, Jr.,
William Augustine Boykin, Jr.,
Robert Lemmon Burwell,
Harry Parr Diggs,
Frederick L. H. Glendmeyer,
William Howard Hamilton,
Arthur Worthington Hawks, Jr.,
Fredk. Worthington von Stein,
Louis Kemp Henninghausen,
Harry Louis Homer,
Ludford Cohoon Jones,
Leon Alvyn Kohn,
Erich Albert Loeser,
Henry Louis Mencken,
Harold Vincent Patterson,
Harry Clay Powell, Jr.,
Gilmor Meredith Ross,
Thomas Quincy Scott,
Henry Bonn Silverthorn,
William Henry Smith,
Roscoe Conkling Sweeny,
Charles Edwin Wilson,
Olin Alexander Wilson.

CLASS OF '97.

Louis Fabian Bachrach,
Alan Marion Bennett,
William Melvin Carter,
Elvin Griswold Cromwell,
John Towson Elsroad, Jr.,
John Montgomery Gambrill,
Ernest Cummins Hatch,
William Hain Kirwan,
Harry L. Kugler,
Chester Waters Larner,
Howard Osgood Preston,
George Gottlieb Schnepfe,
Frederick Lewis Schwartz,
Joseph Stewart Smith, Jr.,
Douglas Alan Sparks,
Joseph Morrison Sparks,
Wilson Ward.

CLASS OF '98.

Thomas Jefferson Andrews,
Alan Joseph Bachrach,
Leo Bauerfeld,
Wilbur McKnew Bosworth,
Frederick Derick Dollenberg, Jr.,
Romulus Griffith Doyle,
John Howard Flayhart,
Henry Galloway,
Charles Raymond Gantz,
Samuel Thomas Griffith,
Alfred Cummins Hatch,
William Herman Hubers, Jr.,
Joseph Lowrie Ingle, Jr.,
John Scott Longnecker,
John Walter McGreevy,
Edward Harris Mealy,
William Charles Metcalf,
John Floyd Miller,
William Eldred Nolan,
Gurdon Tyler Pollard,
Walter Percy Poole,
John Maurice Rehberger,
John McCullough Rife,
Harry Rufus Ruse,
Paul Edward Schaun,
John Henry Sirich, Jr.,
John Smith,
Herbert Turner Snyder,
George Creamer Wilcox.

CLASS OF '99.

Charles E. Allen,
William B. Boettinger,
Harrison Brent,
Hugh W. Brent,
Edward Goodnow Clayton,
Edward P. Cooke,
Charles C. Crockett,
William W. Cushing,
Arthur Councilman Davis,
Charles H. Demitz,
Roland S. Focke,
Harry B. French,
Robert B. Harper,
Charles W. Held,
Ira Johnson,
George A. Knapp,
Walter B. Lang,
Harry Lowenthal,
George P. McCeney,
William E. McCord,
Marion H. McCoy,
Charles E. Mencken,
Charles T. Owens,
Edw. L. Schaun,
Harold B. Vincent,
Joseph A. Ward,
Charles C. Lucke,
John N. McCleester,
Blakely A. McDonnell,
Edwin G. O'Connor,
William Taylor Phipps,
Emanuel J. Sedlacek,
Frederick C. J. Sternat,
Joseph R. Walter,
William C. Whelan.

CLASS OF '00.

John Walter Fred. Blizard,
Roy Stevenson Houck,
Galt Fayette Parsons,
Gustave Frederick Linck,
Horace Kirk Faust,
Thomas Osborn Wansleben,
Samuel Moore Johnson,
Luther Chase Wright,
Walter Bowen Buttner,
Morgan Moore,
John Charles Masopust,
Walter Groverman,
Lawrence Gunton Allbutt.

CLASS OF '01.

Joseph M. Beehler,
C. Ernest Conway,
William M. Demitz,
Charles F. Goob,
Richard G. Harris,
Irving C. Hess,
Charles W. Hoppert,
Carlisle L. Hubbard,
Edward E. Johnston,
Thomas H. Kenny,
Charles E. Lane,
Andrew J. Lowndes,
Ross E. Lynch,
Allen L. Malone,
Richard E. Marston,
Harry Mehrling,
John A. Raidabaugh,
T. Warden Rinehart,
William B. Rosenthal,
Edward Samuel,
John C. Siegle,
Walter H. Tapman,
Sidney C. Vincent,
George P. von Eiff,
Ernest B. Walton,
Arthur S. Weiss,
George K. Yost,
Philip H. Zipp.

POST-GRADUATE CLASS OF '02.

(Four Year Course.)

Joseph M. Beehler,
C. Ernest Conway,
Irving C. Hess,
Andrew J. Lowndes,
Allen L. Malone,
John A. Raidabaugh,
Sidney C. Vincent,
George P. von Eiff,
Philip H. Zipp.

CLASS OF '02.

Joseph A. Baldwin,
Frank O. Boyd,
John B. Cautley,
Robert Dall,
William L. De Baufre,
John K. Flick,
Walter M. Gieske,
Donald S. Hays,
Joseph T. Henthorn,
John S. Hess,
I. Seeley Jones,
D. Frank Lamble,
LeRoy M. Langrall,
H. Quimby Layman,
John G. M. Leisenring,
William N. Michael,
Charles A. Pettit,
William S. Samuel,
G. Forney Shryock,
Charles F. Yardley.

POST-GRADUATE CLASS OF '03.

(Four Year Course.)

John B. Cautley,
Robert Dall,
William L. De Baufre,
John K. Flick,
Walter M. Gieske,
Donald S. Hayes,
John S. Hess,
I. Seeley Jones,
LeRoy M. Langrall,
H. Quimby Layman,

Specials—

Arthur C. Davis,
Charles A. Pettit.

CLASS OF '03.

Elmer Armiger,
Paul Backhaus,
Oscar F. Benjamin,
Owen C. Blades,
Harry N. Brannan,
Frank B. Burton,
William N. Crisp,
John W. Dorsey, Jr.,
Christopher J. Frank,
Milton H. Gross,
Harold M. Parsons,
Ernest M. Poole,
J. McDonnell Reid,
Martin J. Reynolds,
Edward Hering,
Charles E. Herth,
James B. Jones,
Milton Kraemer,
Herman Lucke, Jr.,
Edmund C. Lynch,
Arthur B. Marston,
Harry M. Mason, Jr.,
Sidney Newhoff,
Manly P. Northam,
August H. Schaaf,
Howard I. Schultz,
George F. W. Sims
Wilmer T. Stone.

POST-GRADUATE CLASS OF '04.

(Four Year Course.)

Paul W. Backhaus,
Harry N. Brannan,
William N. Crisp,
Edward Hering,
James B. Jones,
Milton Kraemer,
Harry M. Mason, Jr.,
J. McDonnell Reid,
Martin J. Reynolds,
George F. W. Sims,

Specials—

Frank B. Burton,
H. Milton Gross,
August H. Schaaf.

CLASS OF '04.

Chester A. A. Albrecht,
James B. Arthur,
Marion V. Bailliere,
Joseph Bowes, Jr.,
Andrew K. Brumbaugh,
Clarence C. Clickner,
Edward C. Cromwell,
Frederick L. Dixon,
Charles A. Edel,
Frank B. Fifer,
Emanuel Fritz,
George Gittelsohn,
J. Lyell Gressitt,
Edward J. Hecker,
John H. Hills,
Harry J. Hodes,
Benjamin F. Hoffacker,
Harry V. D. Hunt,
William C. Hurley,
Charles A. Langrall,
Herman W. Lasser,
Daniel J. Leary,
Leon Marmor,
Samuel May,
John L. Mosher,
Charles P. Niederhauser,
Robert G. Pangborn,
Massimo Pisani, Jr.,
George S. Robertson,
George M. G. Schaefer,
Leon Small,
Oscar E. Smith,
Marion Steinberger,
Harry D. Thurlow,
Harry Waldorf,
Charles W Whittle,
Edwin L. Wilson,
Louis A. Witte,
William P. Wittmer,
Alexander H. Woollen.

POST-GRADUATE CLASS OF '05.

Chester A. A. Albrecht,
James B. Arthur,
Joseph Bowes, Jr.,
Edward C. Cromwell,
John W. Dorsey, Jr.,
Charles A. Edel,
Frank P. Fifer,
Emanuel Fritz,
J. Lyell Gressitt,
Richard G. Harris,
Edward J. Hecker,
John H. Hills,
Benjamin F. Hoffacker,
Harry V. D. Hunt,
Charles A. Langrall,
Samuel May,
John L. Mosher,
Robert G. Pangborn,
Massimo Pisani, Jr.,
Leon Small,
Marion Steinberger,
Harry DeG. Thurlaw,
Harry Waldorf,
Edwin L. Willson,
Alexander H. Woollen.

CLASS OF '06.

H. Roy Anderson,
Moses Appel,
Walter K. Bachrach,
Harry C. Becker,
J. Ralph Bolgiano,
William Wallace Boyd,
G. Herman Carl,
Willis B. Clemmitt,
Charles H. Dorsey,
George Erck,
Harry C. Finck,
Edwin Friese,
John R. Guttmann,
John R. Haswell,
Charles W. Henderson,
George F. Heubeck,
Ralph Holbrook,
Andrew C. Kemler,
Howard G. Lanahan,
George F. Lehmann,
Frank T. Leilich,
Harold M. Lewis,
Bernard A. McAbee,
Carl F. Meyer,
Sidney D. Mitchell,
Ferdinand Oppenheimer,
John G. Pertch, Jr.,
Lewis W. Porter,
John T. Ridgely,
John C. Schirmer,
Edward K. Stembridge,
David B. Stewart, Jr.,
Levin H. Stewart,
Israel E. Stolberg,
Frank T. Suman,
Nicholas C. Thalheimer,
Raymond M. Weaver,
George F. Wennagel,
George F. Weighardt,
Phillip H. Williamson,
Walter B. Wills.

CLASS OF '07.

Theodore Ascherfeld,
Ludwig Aull,
Emil G. Bauersfeld,
R. M. Bealer,
Alvin M. Bland,
Gustave Bornscheuer,
J. Daniel Brendel,
John N. Childs,
Wilmer A. Dehuff,
C. Lehman Downs,
Herbert S. Fairbank,
F. Donald Fenhagen,
Otto A. Geumann,
Charles E. Grimes,
Henry R. Gundlach,
G. Herman Guttmann,
Carroll R. Harding,
William Hartman,
Horace K. Hayden,
Harry L. Hess,
F. Merill Hildebrandt,
Fernando Janer,
Harry B. Joyce,
John P. Kenney,
Charles Krausse,
W. H. Kruger, Jr.,
William G. McLaughlin,
Laurence F. Magness,
J. C. Manning,
Lawrence G. Miller,
Charles E. Mitchell,
Serafin M. Montesinos,
George T. Mumma,
Marcus Newhoff,
Samuel P. Nixdorf,
Arthur Norden,
Edwin H. Nordmann,
Charles J. Rasch,
Charles J. Ritterhoff,
Ernest Rodemeyer,
Arthur H. Schultz, Jr.,
Nelson Schuster,
Frederick B. T. Siems,
V. Bernard Siems,
Charles Silver,
Samuel F. Tapman, Jr.
T. Leonard Walter,
Bernard Wich,
R. Mason Wilhelm,
Julius Zieget.

CLASS OF '08.

Otto E. Adams,
Gelston H. Armstrong,
Clarence P. Bolgiano,
Gilbert F. Bolgiano,
Emmet B. Bryan,
Joseph D. Bullock,
Nathan R. Butler, Jr.,
Walter S. Byrne,
James R. Carroll, Jr.,
Thomas D. Conn,
Percy Davenport,
Franklin Davis,
Arturo Diaz,
Austen Gailey,
Frank Goldenberg,
Eugene E. Graham,
T. Douglas Gresham,
R. Milton Hall,
Walter L. Heathcote,
Walter F. Heise,
Harry C. Hess,
Harry W. Hill,
Milton A. Hodes,
Abraham A. Hollander,
Henry J. Horn,
Raymond H. Hoskins,
Henry A. Israel,
Wilbur C. Jackson,
Manual Janer,
Charles R. Justi,
Laurence A. Kahn,
Walter E. Lee,
Andrew H. Lemmon,
Frederick W. Lieberknecht,
Thomas W. Manning,
Richard C. Meyer,
Robert E. Palle,
Mitchell W. Price,
James P. Ray,
Norman G. Reinicker,
Herbert B. Reynolds,
Norman F. Rigor,
Edwin Rolker,
Raymon Schlegel,
Christian Schluderberg,
Othello Schroedl,
Arthur G. Schuster,
Otto Sima,
Benjamin F. Starr, Jr.,
Milton D. Swartz,
Walter M. Troll,
Henry Vogt,
Romaine G. Waltenberg,
Carl C. S. Walter,
Luther Chase Wright,
Frederick A. Zscheuschler.

CLASS OF '09.

Frederick B. Abbott,
Oscar M. Bloch,
George C. Borst,
Frederick Burggraf,
Carlton D. Cann,
Douglas C. Corner,
Harry W. Crist,
William Dalrymple,
Luis A. Deliz,
Frank Fahm, Jr.,
Clarence J. Flayhart,
Roy D. Fleckenstein,
George C. Fultz,
H. Nelson Gambrill,
Wilson N. Gambrill,
Rafael Garcia,
G. Stewart Giles,
John Glaeser, Jr.,
William T. Hanzsche, Jr.,
Elmer Heubeck,
Walter E. Higham,
James R. E. Hiltz,
William Vernon Hipsley,
Franklin E. Holland,
Adam W. Jahn,
Arthur Janushek,
Ernest F. Knabe,
Roger C. Knipp,
Gibbs LaMotte,
William D. Lambdin,
G. Bernard Lohmuller,
William J. Mason,
R. Brooke Maxwell,
Henry C. A. Meyer,
Julius O. Mirski,
Emory H. Niles,
Walter F. Perkins,
Frederick L. Purdy,
Herbert C. Randall,
Paul Rosenthal,
G. William Schindhelm,
D. William Schilling,
Harry B. Siegmund,
Ernest Southerington,
John Snyder,
Frederick C. Stauffen,
William F. Tapking, Jr.,
Leroy K. Thompson,
H. Belin Tinges,
Manuel L. Vincente,
Herbert L. Weaver,
Bertram S. Winchester,
J. Edward Yewell.

MID-YEAR CLASS OF '10.

George E. Gerlach,
George E. Green,
Frank Herrmann, Jr.,
E. M. Kennard, Jr.,
Alfred Mullikin,
Alfred Nisbet,
Carl K. Schulte,
John Louis Siems,
Morris Arthur Spamer,
George J. Sturmfelsz, Jr.,
Wilbur Nicholas Van Sant,
Philip Waldschmidt,
John F. Wannenwetsch,
Russell D. Welsh,
C. A. Yockel.

CLASS OF '10.

Robert E. F. Aler,
William H. Barnard, Jr.,
Ralph G. Bittle,
Leo Blankman,
Jacob Blaustein,
Howard F. Carr,
Laurence B. Chenowith,
Herbert A. Ehrman,
Ernest W. Eickleberger,
Franklin C. Eleder,
George B. Farlow,
George E. Finck,
Charles V. French,
August P. Gompf,
Carroll T. Harris,
Parr Hooper,
Charles R. Johnson,
George Johnson,
William B. Johnston,
Edwin F. Koester,
Robert W. Kroeger,
August J. Kutzleb,
Joseph H. Letzer,
Lewis, W. Link,
Thomas M. Linthicum,
Edward D. Lynch,
Howard B. Lyon,
William E. McComas, Jr.,
Louis Margada,
Eugene D. Milener,
Charles W. Miller,
William N. Neibich,
Dudley F. Nicholas,
Frank Neumann,
John B. Norris, Jr.,
Edgar Parrish,
Abbott L. Penniman,
Ferd. H. Plack,
Edwin A. Plitt,
Henry R. Rausch,
Charles M. Reed,
Richard G. Reese,
Arthur Rhoads,
John K. Ruff,
Albert H. Samuel,
Henry F. Schneider,
Jacob Schmidt, Jr.,
L. Wilson Scott,
Charles L. Steel,
George W. Tall, Jr.,
Perry M. Teeple,
Carroll A. Turner,
Leo Tyser,
Charles P. Vogel,
M. Leeson Walsh,
Frank I. Wheeler,
F. Carey Williams,
John A. Woodfield,
P. Chancellor Wroe,
Roy A. Yingling.

MID-YEAR CLASS OF '11.

Alois Baer,
Ira L. Berg,
E. Ellsworth Hall,
Frederick Hall Jones,
George W. Kelly,
John L. Krausz,
John A. Lindner,
Charles L. Linhardt, Jr.,
Charles L. Maas,
Samuel P. Stewart, Jr.,
Jay W. H. Stoudenmire,
Eugene L. Wolfe.

CLASS OF '11.

John B. Adt,
Wilmer E. Bader,
Wilson T. Ballard,
Gordon J. Barry,
Charles P. Bartgis,
J. G. Bauernschmidt,
Charles F. Bevan,
George W. Black,
John Bohnlofink,
Alan F. Bristor,
W. C. Brooke,
Landon M. Brooks,
William T. Brooks,
Walter A. Brown,
Charles S. Burlingham, Jr.,
J. Ford Coursey,
Charles R. Cox,
Edgar H. Dix, Jr.,
G. Middleton Edwards,
Howard H. Elliott,
J. George Forster, Jr.,
Donald Frames,
Benjamin Goodman,
Leroy S. Green,
S. T. W. Green,
J. Frederick Gross,
Simon Halle,
Arthur F. Holston,
Harry B. How,
Robert E. Kaestner,
J. Dennis Kavenaugh,
Claude W. Keefer,
Frederick M. Kipp, Jr.,
Samuel J. Krotee,
Owens Laws,
Arthur B. Leonard,
Sigmund J. Leskawa,
George R. Loftus,
Christopher E. Loos,
James H. McKay,
Edwin R. McLaughlin,
Walter Mason,
Samuel H. Mazer,
Herbert W. Meinl,
Theodore H. Morrison,
Frank A. Nichols,
William B. O'Connor, Jr.,
George C. Pfaff,
William E. Pinschmidt,
Milton A. Poster,
Charles W. Price,
Herman M. Raushenbach,
William G. Richardson, Jr.,
Ernest F. Ritterhoff,
Gordon Robinson,
John J. Rodemeyer,
Ernest C. Shaun,
John F. Sendelbach,
Aaron L. Shalowitz,
John Shoolbred, Jr.,
W. Carlton Short,
Alfred B. Smith,
G. Nelson Sohl,
J. Henderson Spafford,
Carl E. Spott,
George W. Steinmetz,
Willard W. Troxell,
W. Elwaad Vail,
Otis G. Wilbur,
L. Earl Wilson,
L. Victor Winchester,
Harry M. Wood,
Conrad Zieget, Jr.,
Julius O. Ziegfeld.

MID-YEAR CLASS OF '12.

John G. Bobb,
Oliver Boucher,
John J. Clancy, Jr.,
T. Earle Cooper,
James A. Cullen,
Paul R. Dankmeyer,
Paul Darrington,
Frederick T. Goetze,
Cyrus J. Kearney,
Milton Kemp,
Henry F. Krumm,
Paul L. Lotz,
F. Harrison MacCarthy,
William F. McConnor,
Fred Michel,
William J. Parrott,
G. Harvey Porter,
Walter F. Quast,
Harry Schad,
Edward C. Siebert,
William T. Snyder,
Abraham Tobias,
Paul H. White.

CLASS OF '12.

William C. Andrae,
R. Nelson Atwell,
John Becker,
George Beneze,
Clarence Birnbaum,
Lyle H. Burton,
W. Logan Cassell,
Howard W. Chew,
Davis J. Cloward,
Hyman A. Cohen,
Mark S. DeHuff,
Charles E. Dennis,
Richard P. Drenning,
Samuel H. Eby,
Thomas S. Eichelberger,
Howard Elliott,
C. Clinton Emich,
H. Stockton Ewell,
J. Carroll Finnan,
C. Edwin Fitzell,
Albert Frey,
Harry Fried,
Arthur D. Fulton,
Alfred M. Gagneux,
Sydney F. Galvin,
Frank T. Gartside,
Robb Gover,
William S. Graham,
Theodore W. Hacker,
William J. Heimiller,
Karl J. Heineman,
J. Wilbur Heisse,
Carl H. Horn,
Edgar M. Iglehart,
Abraham N. Krieger,
Eugene B. Link,
Raymond T. Long,
A. Craig Meikle,
Charles A. Mengers,
Rudolph Michel,
William H. Munroe,
Alfred S. Niles, Jr.,
Charles E. Osenburg, Jr.,
Raymond C. Parlett,
Edward S. Poole,
Gustav A. Rasch,
James J. Riley,
Henry H. Roschen,
William H. Sandlas,
J. Albert Schad,
Lester A. Schloss,
Eric E. Schmeid,
Howard J. Schuster,
John A. Sternberg,
E. Raimon Stivers,
Edwin M. Talbot,
Edward J. Thomas,
Frederick C. Traub,
Oliver Travers,
J. Leonard Walsh,
H. Sigurd Walter,
Rowe C. Ward,
Charles B. Watkins,
James S. Webb,
Ormsby P. Webster,
Reuben Wisthoff,
T. Robey Wolfe,
Ernest C. Zscheuschler.

CLASS MEMORIALS.

Framed portrait of Dr. Henry A. Rowland. President to the Institute by the Fourth Year Class of 1903.

Framed picture illustrating the Bessemer process. Presented by the June Class of 1911.